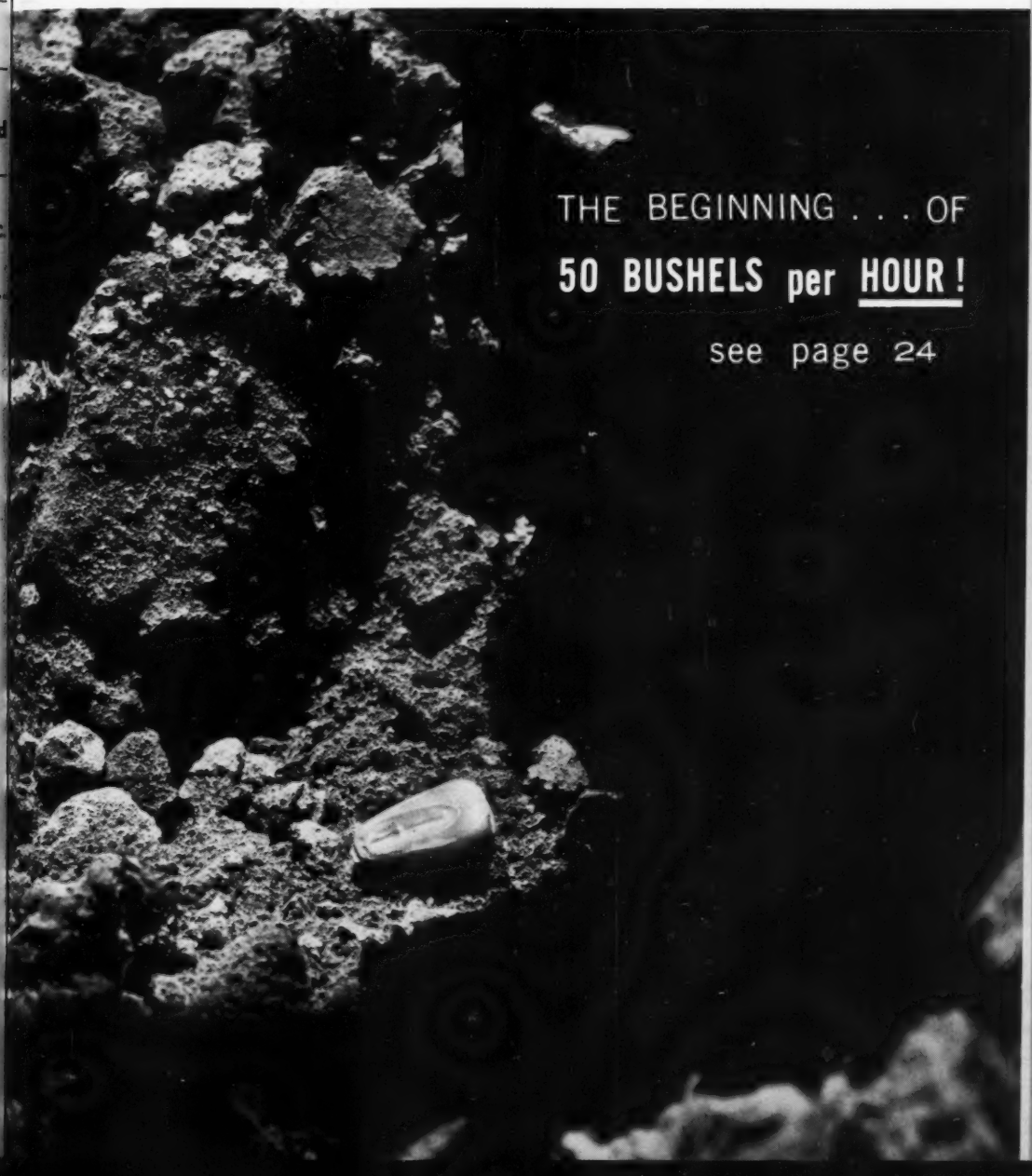
Better Crops

WITH PLANT FOOD

November-December 1961 20 Cents



THE BEGINNING . . . OF

50 BUSHELS per HOUR!

see page 24

Better Crops
WITH PLANT FOOD

The Whole Truth—Not Selected Truth
$1.00 for 6 Issues, 20¢ Per Copy

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ON THE COVER

. . . this is the beginning of all efficiency. How much cost the farmer puts into it, how much labor he expends, how many bushels he produces, how much profit he finally puts into his pocket—all begins here. How one farmer has streamlined his corn production into 50 bushels per hour is told on pages 24-26.

Photo by Grant Heilman

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OH, BUT TO BE A PRINTER'S DEVIL ... ONCE AGAIN

By Jeff McDermid
(Elwood R. McIntyre)

THE modest rural newspaper office is still the entrance way to sound journalistic ambitions.

Many years ago a boy with a hankering for journalism took his first "type louse" courses in home-town newspapering. To become a scoop artist, a star correspondent, a crusading editor, or a smart feature writer meant first becoming a printer's devil.

He arrived at the realm of paste-pots, ink, and forms with his high-school gift pencil sharpened and his blue graduate suit nicely pressed to look worthy of an assignment suited to his talents—for that same newspaper had published part of his commencement oration and predicted for him a scintillating career in the arts preservative.

By nightfall that first day he crept home disillusioned. He had spent a long day in the borrowed overalls of the fat foreman, his hair and nostrils reamed with grime, and his shiny new patent-leathers be-spattered with dirty wash-water. His poor impatient pencil was untouched.

The only salve to his injured pride was a memory of a library book picture of Benjamin Franklin toting his worldly goods in a bundle and munching a bun in Boston.

But within a few days the ignominy of the printer's chore boy had given place to the delights of typographical composition. The high and shiny stool, the blue denim apron with pockets for a shiny nickle rule and a knobby plug of twist tobacco, the ownership of a composing stick with a rusty clamp—and a slow accumulation of upper and lower case lore—these opened the journalistic vistas far ahead.

Meanwhile our observant novice felt that the mechanical department foreman was better at English writing than the arrogant news-butcher with his hen-scratch copy. Once in a moment of revolt over a bungling sentence, the foreman

(named Tony) ground the copy underfoot and set up a new piece fresh from the case with fierce jabs and audible snorts.

Tony's worst anger concerned the obituary of his nearest neighbor. He was insistent that his friend was entitled to a well worded farewell. "His widow is not a *relic* and he did not die *intestine*," Tony growled.

Good old Tony never left the back rooms for a more notable spot in the front office, although many old-timers pushed right on through the newsroom to consult Tony on weighty matters relating to publicity campaigns or advertising layouts.

When the printer's devil had mastered the cases and fonts, his progress was fairly rapid, to the place where the occasional make-ready, lock-up, and planing down of forms was permitted him. With a "yo heave", a double page chase would be jerked up edgewise and held with one hand, while the devil shifted his quid and scanned the sloppy surface of the stonetop table to spy any loose type or copper spaces that might have slipped out below. If all was well justified, the form was carried to the waiting Whitlock flat-bed press.

Glancing up at the red-haired sub-foreman perched near the electric switch behind the feed table, Tony gave the signal which sent the juice jumping into the groaning and bumping press. The young devil envied Jim his feeding job aloft, just as the cook's galley helper looked with some longing at the sail reefer high in the rigging of the old time clipper ships.

Most bitter remembrance was the horrid pile of "pi"—a mess of leads, slugs, metal "furniture," linotype castings, and boiler-plate columns—flung backward and downward from an unclamped press bed on our final run.

Nothing short of several brooms, a hoe, scoop shovel, and bushel basket served to retrieve part of this typo tragedy. Again remorse came to the devil over a six-column theater announcement in display type. The copy proclaimed the show as the "world's greatest immortal drama." But somehow the form was not well justified or wedged. The letter "t" fell out. The Boss had to run the ad a second time free. Customers had noted with mixed consternation and joy that their home playhouse was about to reel off the "world's greatest *immoral* drama." I recall that somebody in the shop asked the theater man if he had a full house the night previous.

Yet many such grievous blunders are dimmed by sweeter memory. When the lights gleamed in the murky composing room in the last hour of some wintry day before we quit and "leaned" our stiff apron against the wall, romance appeared all unexpected. Tripping coyly from her desk in the Boss's sanctum, where she handled want-ads, our gracious little heroine stopped to touch a type or two with dainty fingers, bending over so as to fan the freckles on the devil's cheeks with her glossy perfumed locks and gazing at him with provoking allurement.

She would often say: "Can you dance the cake-walk?" or "Do you like Fox's new novel, *The Trail of the Lonesome Pine*?" or again, "Don't you just adore the Hiawatha waltz?" I often wonder where that charmer is today and how many grandchildren she boasts. But I bet she hasn't heard anyone on the pop records play "Hiawatha" or "Red Wing" as we older ones remember it. But maybe it is just as well.

In those far-off days, girls had begun to make good in newspapering—not in the writing field so much as in the mechanical departments. They were nimble-fingered, keen-eyed and reliable, good especially at the cases. We had the wandering tramp printers, too, who recited poems and lasted while the liquor did.

Most of us in the old town newspaper craft were discriminating, guarded, judicious, and considerate lest we do some grave personal injustice or stir up some mistakes that made men their own worst enemies rather than public ones.

We laughed at foibles tenderly, indulged in harmless wit that left no permanent scars, and tried our best to give every man a proper hearing. We seldom tried to convict the accused before the trial. We seldom printed yarns of dirty things in gaudy feature slop. Of course, we made our enemies and committed blunders and errors, but financial dominance over editorial freedom had not then made much headway in the rural press.

Maybe it is high time to persuade a number of zealous young men and women to return to the home town and expend their courage and energy starting out as "devils" on the road to rugged demand for sound discussion of public questions and clean public information.

It is often said that America cannot really attain true vigor without a capable and independent agricultural structure. So we may earnestly believe that much depends on retaining those fundamental concepts that belonged particularly to the age of the handpress and the country editor in his shirt sleeves.

And if that time ever comes, I should be eager, if permitted, to start all over again as a printer's "devil." Especially if good old Tony or his prototype could stand beside me, so generous with his admonitions and his snuff. **THE END**

SOYBEANS NEED TEAM EFFORT

A PURDUE University agronomist says that a top-notch research program on soybeans might eventually make it possible to prescribe fertilizer treatments that could double or even triple the present U. S. average yields.

Dr. A. J. Ohlrogge says such a program would require a "team approach of soil fertility specialists, plant pathologists, entomologists, plant breeders, and micro-biologists."

He cites increases in corn yields in the past 20 years as an example of what can be accomplished by organized research.

"Between 1929 and 1959," he reports, "the U. S. average corn yield rose from 29 bushels per acre to 52 bushels per acre. Average U. S. soybean yields only increased from 19.8 to 24.5 bushels per acre in this period."

Our "know-how" in corn production has reached the point where it is easy for agronomists to prescribe treatments which, within a year, will double or triple the yield of a field that produces only 50 bushels per acre.

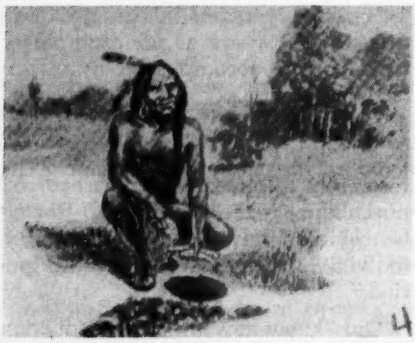
"The agronomist cannot do the same for a field yielding only 20 bushels per acre of soybeans," he says. "One reason is that soybeans do not respond consistently to direct fertilization. But this characteristic is not unique with soybeans. Much the same statements were made about corn twenty years ago.

"Much of the increase in corn yields has come from the combination of improved varieties and increased fertilization.

"We've had really good corn hybrids for about 20 years now, and they are being improved all the time."

Purdue Extension News

Why The Fish FAILED



Two Fish Per Hole

Although this story appeared many years ago—in fact, some years before the first issue of *Better Crops* was published in 1923—it has some application to today. To the experts with no time for the past, it will offer nothing. But to those who know that the only light to the future is the experience of the past,

MY father's old garden at Plymouth, Massachusetts, has, I am sure, produced at least 275 annual crops for white men, and nobody knows how many more for the Indians.

It was no rich virgin soil that the Pilgrims found at Plymouth in 1620. The soil was naturally thin, and had already been in cultivation for years.

The Indians had practiced a rude sort of farming—stirring the soil with shells and sticks and planting corn, beans, and few vegetables. The Pilgrims started with what we call "abandoned land." They made it productive and in doing so, worked out one of the great problems that have followed the farmer for centuries.

They learned the "how" of making that poor soil produce a crop. Had they known the "why" as we know it to-day, the whole history of New England farming would have been changed.

First Station Director

These Pilgrims were not farmers by trade. Few, if any, had ever had any experience in farming or producing food. If they had, they probably would not have tried to grow crops on these abandoned fields at Plymouth. Even the Indians were better farmers than these Whites.

Naturally they went to the Indians for instruction. A friendly Indian named Squanto taught them how to raise corn on poor land. Squanto was thus the first American Experiment Station director.

Early in the spring large numbers of small fish rushed up the river. It was noticed that the Indians caught and saved many of them beyond what they needed for food.

When corn planting time came, Squanto scooped a hole in the ground, put in two of the dead fish, scattered a bit of sand over them, planted his seed, hilled it up, and called his job done. Squanto was neither the first nor the last teacher of practical agriculture who has had scoffers in his classroom.

The Pilgrims, like many farmers who have lived since their time, were somewhat set in their ways and had never before heard of this manuring with dead fish. They doubted their teacher's wisdom, but as he had a corn

crop to show, they finally planted their doubts with the fish and followed his methods. They were wise, for the corn prospered and in time gave a good yield.

New Trouble Comes

The Pilgrims thought that settled the corn question, for the sea was full of fish and land was abundant. After a few years, however, there came a new trouble which they did not understand.

In spite of the fish, the corn began to yield less and less grain when planted in that field. They used twice as much fish and still there was little grain, though the stalks were tall and thrifty.

In these days the experiment stations would quickly tell us the "why" of this, but Squanto never pretended to be an "agricultural chemist." All he knew was that when fish failed to make a good crop of corn, the "why" of it never filled his stomach in winter. It was then time to leave that field and take another piece of ground.

The Pilgrims were not inclined to be original and so they did the same. They noticed that while the field was abandoned, it was not idle. A natural growth of weeds, grass and brush or little trees grew up and a few years made a thick growth.

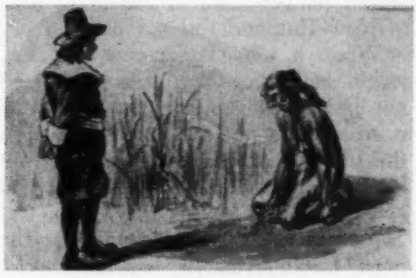
It was found, somewhat by accident, that if this natural growth was burned on the ground, a little coat of ashes would be left and then, strange to say, several more good corn crops could be grown if fish were used in the hill. This was probably the first attempt at a "rotation" on an American farm.

Corn was grown until it failed to respond to the fish. Then, when the soil was left alone, a new crop came in, worthless in itself, yet, when cut and burned, gave the fish such help that it could produce more corn. Of course, this led to experiments with wood ashes.

It was found that such ashes used in the hills with the fish made the crop sure. Great brush heaps could be burned in some convenient place and the ashes collected. A handful of the ashes, with a couple of fish, gave a better hill of corn than a dozen fish used alone!

By H. W. Collingwood

Late Editor of
The Rural New Yorker



Trouble Comes

it will provide an interesting insight into how far we have come in some respects and how changeless certain principles are, after all. It is not offered here as an important agronomic document. Instead, it is offered as a piece of almost quaint reporting about a subject important to most of our readers—the editor.

Why Ashes Helped

Now, why did the ashes help the fish? What did they do, or what lack did they supply? If the Pilgrims had known what we now know, there would be very few abandoned farms in New England today.

When a man is farming on rich, virgin soil, the *why* of things need not bother him much; but when he is on soil that needs help of some sort, the *why* becomes master, for without knowing it, we can not feed the soil economically.

An empty stomach, which is the most forcible teacher in the world, convinced both White and Red man that fish alone would not produce corn year after year, and so they hunted up new land just as thousands of other farmers have done since their time.

You must remember that neither Squanto nor his White friends knew that nitrogen, phosphoric acid and potash must be within reach of plants all the time if we expect a crop. They had never heard of these elements of plant food.

If one of our modern chemists had gone to these farmers and told them what we now know about plant feeding, the chances are they would have whipped him out of town at the tail of a cart. It was more than two centuries before the common people even began to realize what it means to provide a balanced ration for a crop, and that there must be all the fertilizing elements present in the soil if we hope to grow a crop.

Who Learned the *Why* of It?

The chemists dug away at this old problem until they picked the fish and corn apart. Then it was made easy as it is for the boy when the clock is opened and he sees the springs and wheels which make the hands go. The chemists found among other things, the following:

POUNDS IN ONE TON

	Nitrogen	Phosphoric Acid	Potash
Fish,	100	110	None
Corn,	32	12	7
Corn Stalks,	12	4	20
Wood Ashes,	None	35	100

A study of this table proves that the fish failed not because it was "bewitched," or because the farmers had committed some sin, but because it added no potash to the soil. The *why* is easy when we get at it in this way.

In order to produce fifty bushels of shelled corn and two tons of fodder, which go with such a yield, it would be necessary to have in the soil where the crop could easily reach it, not far from seventy pounds of nitrogen,

twenty-five pounds of phosphoric acid, and fifty pounds of potash.

The soil itself to begin with was poor. The Indians knew that, because they knew that unless the fish were added, they had no corn. We see from this table, that when they kept on using fish year after year, they put nitrogen and phosphoric acid in the soil, but no potash.

For several years the corn crop made a fair growth on the potash it could find in the natural soil. When this supply failed, since no more was added with the fish, of course, the plant could not perfect its ear since there is nothing that can take the place of potash in the growth of the plant.

Each Element: A Specific Job

The Pilgrims found that out to their cost, and all that chemists have learned since then, only goes to prove that no other element can do the work in plant feeding which nature has assigned to potash. We must understand this fact about the three leading elements of plant food.

Nitrogen promotes growth; phosphoric acid gives frame and shape, not unlike the bony skeleton in the living body; potash controls the living functions of the plant, gives it character and life, in one way like the blood and vital force.

These elements cannot "change works," each has its separate part to do; and if one is lacking, it is the lack of that one and not the abundance of the others that will determine the crop.

The Pilgrims used fish until there was far more nitrogen and phosphoric acid in the soil than was needed, yet it was of no use to the corn because there was no potash.

The little pinch of potash contained in the ashes did the corn more good than ten fish would have done, because the fish contained no potash whatever. The result would have been much the same, if, after learning that

wood ashes were so valuable, these early farmers had concluded that there was no sense in using any more fish.

They probably would have tried that, if the fish had cost money. They might have burned down the forest and thus obtained ashes enough to fertilize their fields year after year. After a few years the corn would have refused to grow. It would have dwarfed from head, shoulder, and waist, finally to knee high.

The reason for this will be as clear as daylight when we look at our table, for we notice that while the ashes would supply potash and phosphoric

acid, there is no nitrogen, and as soon as the supply of that material already in the soil is exhausted, the plant refuses to grow.

If the fish be put with the ashes, the corn grows because in this way nitrogen is added. A farmer can not have this truth too clearly in mind: all three of the fertilizing elements must be present if we expect a crop.

Locked Up: The Problem

But if all this is true, how did it happen, that when they cut and burned the brush, they were able to raise more corn? I thought you said the corn took all the potash out of the soil. I said the corn took all the *available* potash, that is, all it could reach.

The brush and the coarser grass were able to utilize supplies of potash, which were beyond the power of the corn to absorb. When these hardier plants were burned, the potash in the ashes was made available for the corn crop.

Suppose you turn a tame house-dog out in the woods and make him stay there. The chances are he would starve. Turn a woodchuck or a fox of the same weight into the woods, and he would make a good living because he and his ancestors before him have been obliged to hunt for their food. Kill those animals and let the dog eat them and he will grow fat. All soils contain potash, but it is mostly "locked up" in forms which place it beyond the reach of the cultivated crops.

Wild crops, like wild animals, are able to obtain supplies of food which would baffle their cultivated cousins, so that when a field is given up and "abandoned," it may slowly become productive again. There might be potash enough in one acre of soil to produce 1,000 annual crops of corn, and yet it might be so insoluble that the corn would not grow until 100 pounds of *available* potash were scattered over the acre.

We know better now than to let a field grow into brush and coarse grass in order to obtain available potash. We buy the potash outright and feed it to such crops as clover and cow peas. These crops utilize more of the natural potash in the soil and when they are plowed under or fed to the stock and brought back to the soil as manure, increased crops of corn, or potatoes, or other food crops may be grown.

As we will see, it was chiefly the lack of available potash, certainly next to the shortage of nitrogen, that made New England farming unprofitable, and sent so many of the best boys and girls West, after "stronger land."

Now, the stock or dairy farmer will say that this does not apply to him, because he uses manure and thus keeps up a full supply of potash.

"Where do you get this potash?"

"Why, I buy a lot of it in my grain!"

You should not be too sure of that, —Squanto and his White friends would have said much the same about their fish. Let us not guess about it, but apply the same test that we did to the fish and the corn.

Here is another table:

POUNDS IN ONE TON

	Nitrogen	Phosphoric Acid	Potash
Stable Manure,	10	6	12
Wheat Bran,	45	56	28
Corn Meal,	32	6	3
Brewer's Grain,	15	9	1
Cottonseed Meal,	80	60	29

I mentioned these feeds since they are such as a dairy man would buy. You will see when a man buys grain, he brings to his farm fair quantities of nitrogen and phosphoric acid, but much less potash.

It is not as bad as was the case with the fish, for that had no potash at all, but you will see that in all these grains potash is lacking as compared with the others. Thus, when the farmer feeds the hay and fodder grown on his own farm and buys grain, he does not add nearly as much potash as he may think.

Safe Rule: Use Enough

You will notice also in this table, how the potash compares with the other elements in stable manure. On an average soil, which has been cropped for some years, it is a safe rule to use with each pound of nitrogen, three pounds of phosphoric acid and at least two and a half pounds of potash.

There are soils, no doubt, where this proportion would not be profitable, but unless a farmer has tested his own soil and *knows* better, he should be sure to use enough potash.

Let farmers think of the potato fertilizer which has given them profitable crops. Does it not always contain two and sometimes *three* times as much potash as it does nitrogen?

We see at a glance that stable manure does not supply any such proportions, for both potash and phosphoric acid are lacking. This being the case, you can easily see, that in order to obtain the potash which our crops need, we must use so much of the stable manure that there will be a waste of nitrogen.

That was what happened in the case of our old friend Squanto. When the corn crops began to fail, he used more and more fish. Had there been a little potash in the fish, he could have made his corn crop by using large quantities of fish, but most of the nitrogen in it would have been wasted.

Had he been obliged to pay for the fish, he would soon have been forced out of business as a farmer. Now, stable manure costs money, and when a farmer uses it as Squanto used the fish, he is sure to lose both cash and crop.

Look back at the table showing the analysis of grains and feeds and you will see that there is less potash in them than of either nitrogen or phosphoric acid. While a farmer who buys grain may secure considerable nitrogen and phosphoric acid, the supply of potash is but little increased.

But does not this show that because there is less potash in these grains, this element is not so necessary as the other?

Not at all.

Affects Vital Functions

Potash, more than any other element, has to do with the *vital functions* of the plant. Unless it be present in the plant, the formation of starch and the processes which correspond to digestion in animals cannot go on.

While nitrogen and phosphoric acid remain largely in the body of the plant or animal, potash affects the vital functions and then is passed away. It is thus fully as necessary as the others, while we can easily see that the amount of it, which remains stored up in the body, is no measure for its actual importance.

To illustrate, we might prove by the

Turn to page 29

AN FAO RELEASE

OVER 1,100 fertilizer demonstrations and trials are now being conducted in the Near East and West Africa under the program to accelerate fertilizer use through the Food and Agriculture Organization's Freedom from Hunger Campaign.

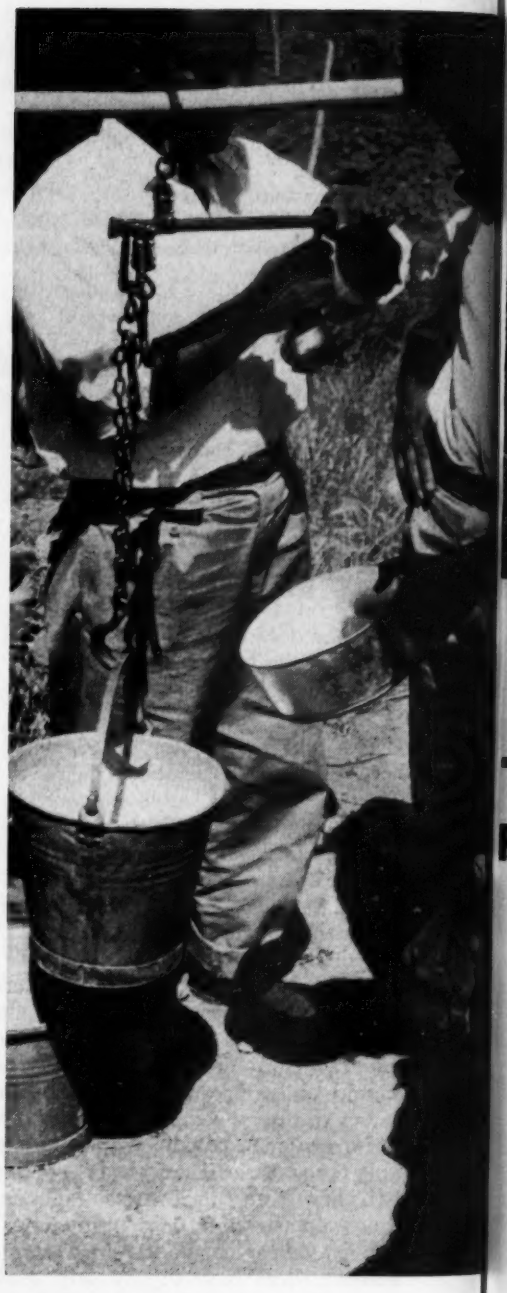
Being conducted during this autumn-winter season, these demonstrations break down about as follows: Syria (150), Lebanon (40), Turkey (470) and Morocco (100) for a Near East total of 760; Ghana (50) and West Nigeria (330) for a West African total of 380.

The number of demonstrations is planned to increase rapidly over the 1962 spring-summer-autumn period when about 8,000 demonstrations and trials will be carried out in these two regions and Northern Latin America.

FREEDOM . . .

The following schedule is proposed for this stage of the fertilizer program, according to Dr. H. L. Richardson, project Manager: Syria (200), Lebanon (100), Turkey (1,100) and Morocco (500) for a Near East total of 1,500; Ghana (1,100), West Nigeria (2,000), East and North Nigeria (200), Senegal (500) and Togo (100) for a West African total of 3,800—together with at least 2,000 in Northern Latin America, where the intention is to start work in such countries as Colombia, Ecuador, Venezuela, and Costa Rica.

The fertilizer program, being financed by the world fertilizer industry, started in March 1961, and has been planned on the basis of a five-year period. It is intended to stimulate the interest of governments and farmers in fertilizer use.



IN SYRIA trainees weigh fertilizer required for one plot during training course on fertilizers. Such on-the-job training is normal part of the program.

IN LEBANON an instructor demonstrates broadcasting to trainees. Note plates on soil to control uniformity of broadcasting over the 5-metre wide strip.

. . . FROM HUNGER

FERTILIZER PROGRAM

Staff Makeup

Staffing of the program is still underway, though two regional team leaders have already toured and reported on their areas and are now organizing the field work in individual countries.

Dr. F. W. Hauck is responsible for the West Africa field program, while himself concentrating on Ghana and Togo, and looking after Western Nigeria as well until a soil fertility specialist is appointed there. Mr. M. Mathiou is responsible for the Near East field program, concentrating on Syria and Lebanon. Dr. C. H. H. ter Kuile was recently appointed team loader for Northern Latin America. In addition, Mr. G. Claude, Mr. R. Steiner and Mr. R. C. Bennet are working as soil fertility specialists in Senegal, Turkey, and Morocco, respectively.

In most of the countries involved in the program, national personnel have already been engaged, including officers to act as counterparts to FAO staff, technical officers to supervise the demonstrations and trials, and field-level workers to provide the immediate contact with the farmers.

It was estimated that FAO and the industry would contribute 11 man-years to the first full year of the field program, while participating govern-

IN GHANA a farmer uses an iron plow near Nyangpala. Such plows are few. And far between. But they are increasing. And so are the draught cattle. Farmers like these are the first to participate in the fertilizer demonstrations.

ments would contribute up to 263 man-years to carry out the target figure of over 5,000 demonstrations and trials in West Africa and the Near East regions alone.

High Targets

"Several of these countries were already operating fertilizer programs on their own," said Dr. Richardson. "These are now being continued and enlarged under the auspices of the FAO program. In some countries, quite high targets have been set for future fertilizer use, and demonstrations are urgently needed to accustom the farmer to this agricultural method.

"Attention of the program has been centered upon these three regions—West Africa, Near East and Northern Latin America—because of the pressing need for increasing agricultural production in these countries," Dr. Richardson said, "and because other areas of the world have already received much encouragement and advice on accelerated fertilizer use."

Tangible Examples

FAO has been carrying on fertilizer programs in South and Southeast Asia, for example, over the past ten years through the International Rice Commission, training centers, and individual projects and experts.

One example is Pakistan where some 3,300 field experiments in East Pakistan and some 2,400 in West Pakistan have been conducted by FAO since 1957. This program, which has demonstrated to many farmers the increased (often doubled) yield resulting from fertilizer use, is now being accelerated by the Pakistan Government.

"Our fertilizer program is being helped by such related projects as the soil fertility survey in Iran, now being carried out by FAO as executing agency for the UN Special Fund for

Economic Development," said Dr. Richardson. "This five-year survey will assess the soil fertility level, nutrient responses, and fertilizer needs in Iran, centered around large numbers of fertilizer field trials. It should be of considerable benefit to Iranian agriculture."

Regional Approach

The fertilizer field program in the Near East will be coordinated with the Regional Wheat and Barley Improvement and Production Project, in which ten countries from Afghanistan to Libya are participating, and which is also being conducted under FAO's Freedom from Hunger Campaign.

Dr. Richardson explained that the regional approach has been followed as the most effective way of advancing the program through exchange of information and pooling of experience. Regional fertilizer meetings are being organized and will be held from time to time to discuss common problems and solutions.

Operational assistance and technical guidance will be provided by the regional leaders through specialists assigned to individual countries. Marketing and development studies will be carried out at FAO headquarters by Mr. J. Couston, the project economist.

Plans Per Country

1 In individual country programs, selection of working areas and experimental crops will be followed by soil testing.

2 After the program itself has ended, it is hoped that fertilizer trials and demonstrations will continue through normal agricultural extension work.

3 Training courses will form an important part of the national programs, in addition to on-the-job training for field workers.

Different Objectives

Demonstrations and simple trials have different major objectives.

1 The prime object of demonstrations is to bring fertilizers to the farmer, to encourage him to apply the fertilizers himself, and to show him and his neighbors how they can increase the yield of their crops.

2 The object of simple trials is to find out more about the response of different soils and crops to fertilizers. This will mean better advice on fertilizer selection, and on the best and most economic rates and ratios of application.

Crops to be included in the demonstrations and simple trials are *wheat, barley, maize, millet, sorghum, rice, yams, olives, forage crops* and *pastures.*

To these may be added others, such as *sugar cane, bananas, young cocoa* and *young oil palms,* at some later date.

In both demonstrations and trials, consideration will be given to other good crop management practices, for, as Dr. Richardson says, "Food production in many of these countries can be doubled within one generation using fertilizers in combination with good farming practice."

THE END

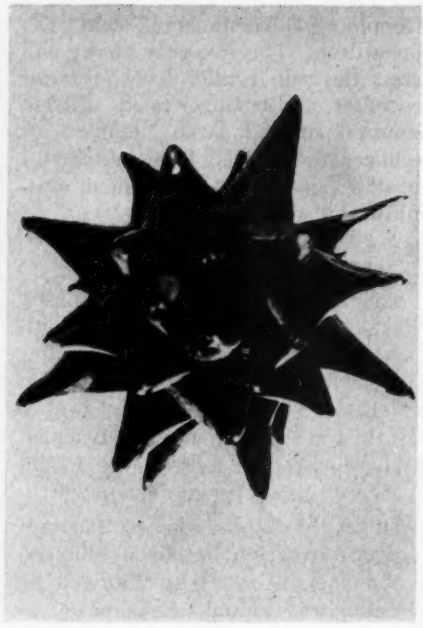
FOLDERS FOR

YOUR

MEETINGS

TURN TO PAGE 28

WHAT IS IT ?



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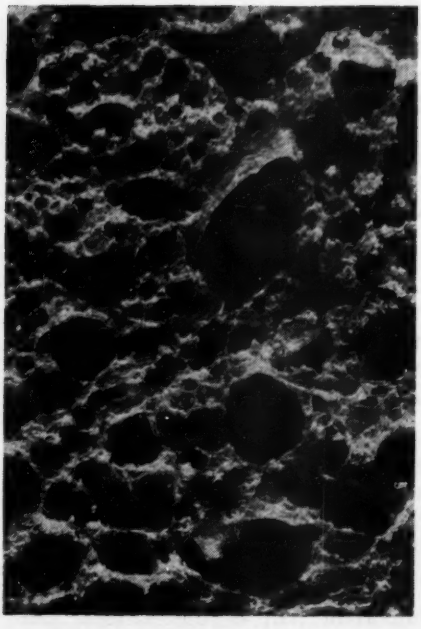
By Michael Kosinski



2

HOW good is your observation? Do you see what you look at?

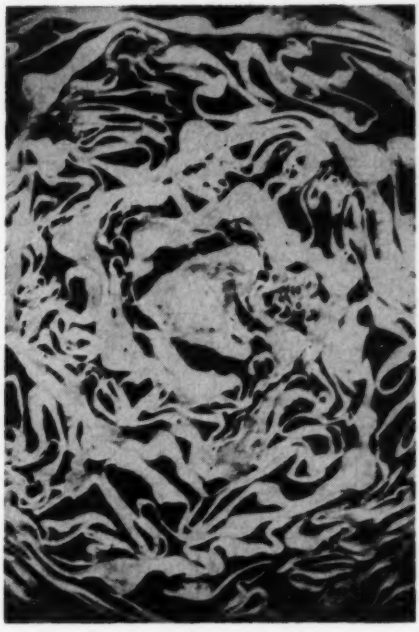
The photographs on these pages are common food items. Several of them you use daily.

Some items were photographed in their normal pattern such as would be found on a kitchen work table. Others are merely enlargements.

How many of them can you identify?

A score of 60 is passing; 70, good, and 80 or more, excellent.

Answers on page 26



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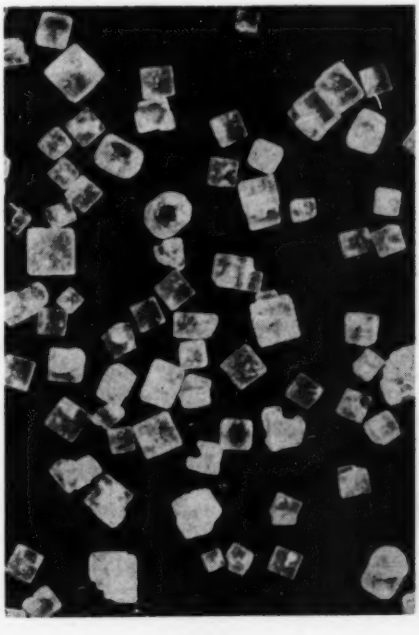

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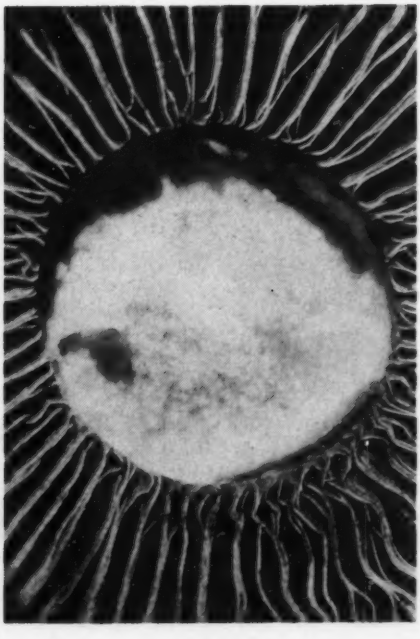

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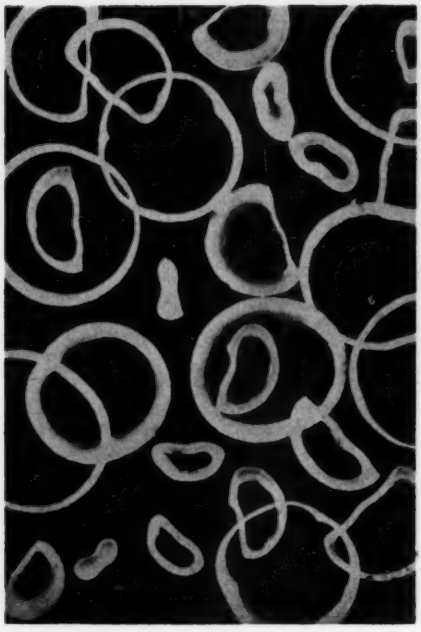

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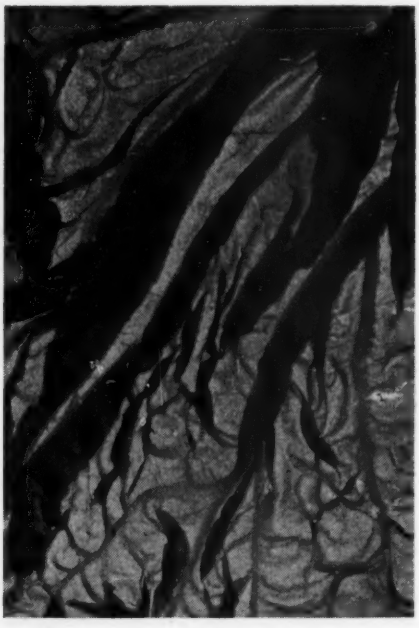

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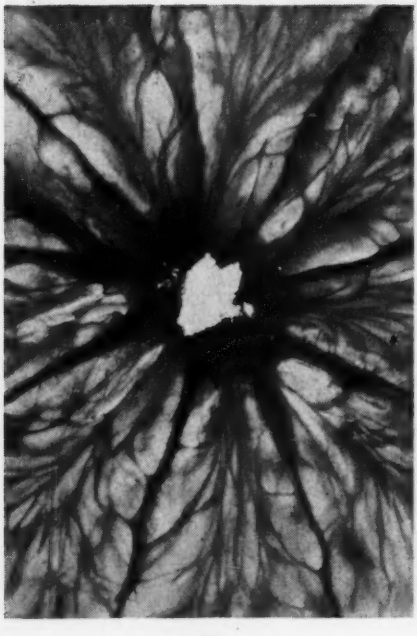

9

10

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Growing Alfalfa Successfully	B-5-60	_____
Potassium in Row Fertilizer for Corn	A-3-61	_____
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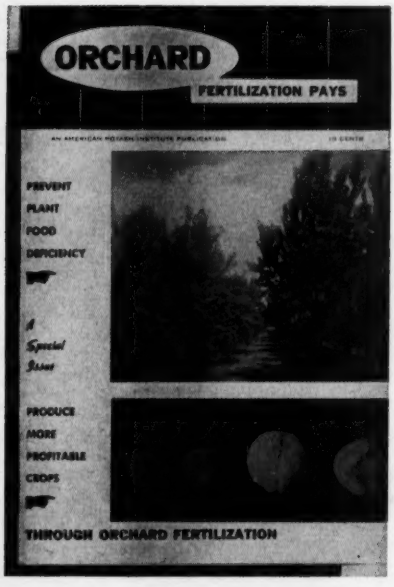

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THEY JUST CAN'T BELIEVE IT

AN American newspaper editor, recently returned from a tour of Russia, reports that our farm problem, a source of worry for farmers and the government, is a source of astonishment for the Russians.

The Russians just can't believe that for nearly 30 years now this country has been trying to find some way of holding down production of some of its biggest crops until supply is more in line with demand.

The idea of a farm surplus is so foreign to their experience that Russian farmers, constantly pushed to increase production with inadequate machinery, fertilizer, and insecticides and shortages of almost every other necessity, find it incredible.

Even more incredible to them is the fact that America produces this abundance with only 10 per cent of the people working on farms, as compared to 40 per cent in Russia.

Proud of the fact that they have at last equalled this country in one field, total milk production, the Russian farmers do not realize that this country, with a population about 40 million smaller than that of Russia, uses as much milk and produces it with 12 million fewer cows.

On the finest collective farm that his party visited, this American observer says there was an average of one worker for each two acres of cropland. Cows averaged only 3,500 pounds of milk a year, hardly enough to pay their keep.

Similar observations can be made concerning production levels and efficiency of operation in almost every phase of Russian agriculture. Farm production continues to represent one of our greatest advantages and one of Russia's greatest weaknesses.

LSU Extension Service

HELP CUT EROSION VIA FERTILITY

Adequate soil fertility helps prevent erosion, Earl Kroth, University of Missouri soils researcher, reports.

Kroth says results of trials at the Midwest Claypan Experiment Station near McCredie give concrete evidence of fertility's effect on erosion. This research was conducted cooperatively by the Missouri Agricultural Experiment Station and the Agricultural Research Service, U. S. Department of Agriculture.

Plots in continuous corn during 1954-60 receiving only starter fertilizer lost an average of 1.7 tons of soil per acre per year. Plots receiving full soil treatment lost only 1.4 tons of soil per acre. Average corn yields for 1955-60 were 51 and 101 bushels respectively.

The effect was less noticeable with corn grown in rotation with wheat and meadow. Soil losses under both starter and full treatments were .8 ton per acre but respective corn yields were 77 and 104 bushels per acre.

Effect of fertilizer was even more evident after a 4-inch rainstorm last summer, Kroth says.

Continuous plots with starter fertilizer only, had 1.7 inches of runoff and lost 3.4 tons of soil per acre. Full treatment plots had 1.1 inches of runoff and lost 1.5 tons of soil per acre.

Kroth summarizes by saying that adequate fertility helps prevent erosion by promoting a heavier, faster developing crop cover. However, adequate fertility will not take the place of mechanical erosion control measures such as terraces.

Missouri Farm News Service

POTASSIUM—we sometimes refer to it as K—is the element plants use in potash fertilizer.

The sap of growing plants is rich in potassium. It is needed so plants can use other plant food elements.

Potassium makes plump seed, well filled ears and strong stems. It increases the size, flavor and color of some fruits and vegetables.

If legumes or clovers do not get enough potassium, weeds gradually take over. Weeds do not need as much potassium as legumes.

When you put potassium in the soil—as the potash part of fertilizer or in manure—the potassium becomes water soluble. The soluble potassium grabs onto the nearest clay particles.

It clings to the outside of the particles. If you have enough potassium in the soil the clay particles absorb it. Each clay particle then acts as a tiny store house.

As organic matter breaks down, it forms mild acid. Part of the acid replaces the potassium on the clay particles. The potassium becomes soluble in soil water.

Plants absorb the potassium from soil water or the small root hairs may take it directly off the clay particles. As the potassium on the outside of clay particles is used or goes into solution, the stored potassium in the particle moves to the surface.

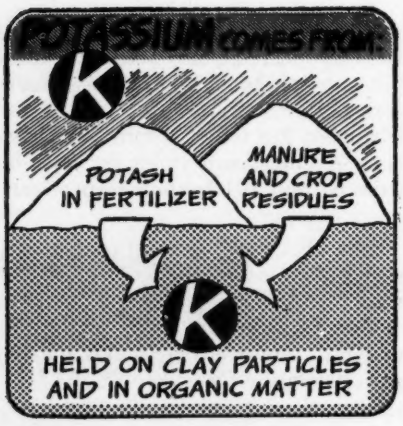
Cropping, freezing, thawing, liming and drying all tend to make potassium more available in the soil. The amount of potassium which plants can use is highest in the spring, lowest at harvest time.

In Stems and Leaves

Most of the potassium in plants is found in the growing stems and leaves. You take off the land a large amount of potassium when you remove a hay crop.

A ton of brome grass contains about 53 pounds of potassium. A ton of alfalfa, 32 pounds. That means that you carry off about 100 to 150 pounds of potassium a year when you cut alfalfa for hay.

An average crop of potatoes has about 100 pounds of potassium. The grain in an average corn crop contains about 15 pounds, the stover, 50 pounds. Small grains—barley, oats,



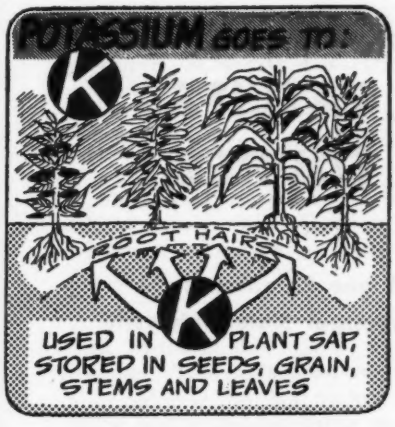
POTASH PUTS PUNCH

wheat—have about 10 pounds of potassium in the grain, 30 pounds in the straw.

The potassium in dead stems and leaves is quickly lost. A heavy rain washes potassium out of mature or dead plants.

You lose potassium from the soil by cropping, leaching and erosion. Organic soils, coarse textured acid soils or sands have few clay particles. With no clay particles to hold the potassium it quickly washes out of the soil.

Here's how to get the most from the potassium part of the fertilizer you apply.



INTO PLANT FOOD

Get Best Results

1 Know the amount of available potassium in your soil. A good soil test will give you this. Silt loams and clay soils have enough clay particles to hold potassium. You can build up the supply in these soils by applying more than the crop needs. Building up available potash from 160 to 250 pounds per acre is a good bank account for high yields.

2 Consider the crops you intend to grow. Some crops like tobacco and potatoes, need lots of potassium. Apply potassium at planting time for high yields of heavy potassium feeding crops.

3 Cropping methods make a big difference. When you take off hay, you carry away 100 to 150 pounds of potassium a year. Grain takes only one-fourth as much. Grazing animals return 75 to 90 percent of the potassium to the soil.

4 When you apply potassium, put it where the plant roots can get to it.

If you apply before planting, disk it in, or better yet, plow it under. Band starter fertilizer 1½ to 2 inches from the seed. Soybeans are especially sensitive to potash too close to the seeds.

5 Livestock excrete most of the potassium in the liquid parts of the manure. It's readily leached out of the solid part by rain. Keep the manure in a dry place. Use lots of bedding to soak up the liquids.

6 Use a balanced fertility program. Plants getting plenty of potassium but not enough nitrogen and phosphate start off fast, but soon become stunted.

—Wisconsin Agriculturist

THE yield of 283 bushels of corn from a single acre is the report this year from the famous Ratliff demonstration in Prentiss County, Miss.

This is the same acre on which the 304 bushel yield credited with being the world's highest to date was made in 1955 by Lamar Ratliff, who was then a 16-year-old 4-H Club member.

Lamar conducted his demonstrations, all on the same acre of land, from 1950 through 1956 when he entered military service. His brother, Lindon, then took over until this year and is now a college student. Their father, Paul Ratliff, helped them and is carrying on with determination to beat the 304 bushel record.

Advising the Ratliffs and supervising the checking of the yields each year have been County Agent W. T. Smith and Associate County Agent J. W. Archer, both of Booneville.

The Ratliff demonstration is one of many that these two Agricultural Extension Service agents led in establishing. As a result, the average corn yield for their entire county has increased from 17 bushels per acre in 1945 to an estimated 45 bushels per acre for 1961.

ANOTHER RATLIFF TOPPER

By
Duane Rosenkrans, Jr.
Mississippi State University

This program has influenced better corn production over a much larger area than Prentiss County.

In this 1961 demonstration, Mr. Ratliff began on October 2 to pull the corn from the stalks and pile it between the rows, finishing this job on October 7.

On October 12, with several members of the Prentiss County Agricultural County Coordinating Council present and some neighbors helping, County Agent Smith supervised the weighing of the corn. It totaled 21,111 pounds of ear corn, the highest yet from the acre.

NOTE: All of the corn on this Measured Acre *was picked and*

10 YEAR RECORD ON RATLIFF ACRE

1952	214.10	using Funk's G-711
1953	165.00	using Funk's G-711
1954	218.50	using Funk's G-711
1955	304.38	using Funk's G-711
1956	257.50	using Funk's G-711
1957	250.85	using Funk's G-711
1958	226.99	using Funk's G-711
1959	242.37	using Funk's G-711
1960	295.00	using Funk's G-711AA
1961	283.00	using Funk's G-711AA

Ten Year Average: 245.76 Bushels Per Acre

weighed, thus giving an accurate, exact weight of the corn which was produced. It is felt this 100% yield-measuring method is more accurate than are some methods which simply call for the harvest of a small fraction of an acre, and then assume the rest of the acre was exactly like it. When all *the corn from a* Measured Acre *is harvested, there is no such "Error Factor."*

The moisture content of 20.37 percent was also the highest ever from the acre. This high moisture considerably reduced the final yield figure, as computed by recognized standards, the county agent pointed out.

"We think, perhaps, that the corn being planted a month later than usual, the high nitrogen in the soil, plus late fall rains account for the unusually high moisture content," County Agent Smith stated.

Cultural practices this year were similar to those of the past. Mr. Ratliff broadcast about 38 tons of barnyard manure on the acre and plowed it under. He plowed 11 times during the fall, winter and early spring.

Before planting he placed 1,500 pounds of 14-14-14 and 1,500 pounds of ammonium nitrate about 20 inches deep. He planted one bushel of Funk's G-711AA on April 27 in 30 inch rows and hand thinned to a population 20,-500 plants on the acre. The side dressing was 500 pounds of 14-14-14 and 500 pounds of ammonium nitrate.

Mr. Ratliff cultivated this corn twice and irrigated six times.

In his effort to beat the 304 bushel record, he will probably use a different spacing next year. About 250 people attended a field day on Oct. 13 at the Ratliff farm.

THE END

STEPS TO SUCCESS

1 Field plowed 11 times during winter.

2 38 tons manure broadcast on acre between plowings.

3 Before planting: 1500 lbs. of 14-14-14 and 1500 lbs. ammonium put down deep.

4 Funk's G-711AA planted on April 27, 1961.

5 Field cultivated twice.

6 500 lbs. of 14-14-14 and 500 lbs. nitrate used as side-dressing.

7 Nine-week drought necessitated six irrigations.

8 Entire acre of corn harvested by Paul Ratliff and weighed by Agricultural Extension Agents.

9 Moisture and shelling percentage taken and yield calculated to #2 corn.

CORN PLANTING TRAIN:

■ Tandem tractors from power unit, front tractor carrying herbicide tank, a PTO pump delivering it to the spray nozzles back of planter.

■ From tank bracketed to plow frame, anhydrous ammonia is released through flexible tubes beneath the five 16-inch furrows.

50 BUSHELS OF CORN PER HOUR . . . BY A M

As Reported By J. A. Porter and R. E

WHEN a farmer can realize 50 bushels of corn per man hour of labor, he's ringing the efficiency bell good and hard.

That's what Michigan farmer, Richard S. Walters of Lewanee County, did with his continuous corn system in 1961.

He obtained a yield of 148 bushels per acre from a measured five acres, dried to 11% moisture and delivered to the elevator.

He achieved the unusual labor efficiency by combining high population, adequate fertilization, and weed control with his own version of plow-plant, *a truly once-over tillage operation.*

The plow-plant combination might be described as a corn planting "train." This "train" has an over-all length of 31 feet, with the couplings linking five components into a smoothly running, efficient outfit.

The field with mulch from last year's corn stalks is plowed, fertilized, planted, and weed-protected at the rate of two acres per hour. The next operation is corn picking. Besides the planting and harvesting, the only other field operation is shredding the stalks.

■ A trailer behind the plow carried solution starter fertilizer. The trailer wheels are centered at 40 inches, providing tracks for the two 40″ row planter.

■ Soil on this field—Hoytville silty clay loam.

A MAN WITH A TRAIN!

R. E. Lucas, Michigan State University

The power unit heading this planting train consists of two tractors in tandem which provides adequate power with a minimum of soil compaction.

The plow unit of five 16″ bottoms covers the width for the two 40″ row planter. Bracketed to the plow frame is a 100-gallon anhydrous ammonia tank. The ammonia is released under the furrow through rubber tubes at a rate of 140 pounds of nitrogen (N) per acre.

Coupled to the plow is a two-wheel trailer which carries the starter fertilizer, and with its 40-inch centered

Richard S. Walters

Lewanee County, Michigan

tires, prepares the wheel tracks for the tandem coupled planter. The starter fertilizer is a 3-11-11 in solution form, carried in a 240-gallon tank.

The planter operates on the firm seed bed prepared by the trailer wheels.

The 3-11-11 solution fertilizer is placed two inches to the side and two inches below the seed level. Weeds are effectively controlled for the entire season through a complete coverage spray, the nozzles being on a boom supported from the trailer at a position to the rear of the planter.

The atrazine is carried in a 100-gallon tank *bracketed to the left-hand side of the front tractor.* A PTO pump delivers the solution through a plastic hose back to the nozzles.

The effectiveness of the herbicide is enhanced by the loose condition of the untilled plowed soil between the rows.

Planting is at a rate to give a final stand of about 19,000 plants per acre.

Turning area is provided by leaving a 16-row headland. The system of back and dead furrows is planned so that the field is finished with a 16-row width remaining on the sides of the field to be planted with these headlands, in an around-the-field operation.

The "train" is an easy, one-man operation. The second man keeps the equipment supplied with anhydrous ammonia for plow-down, starter solution, atrazine solution, seed and tractor fuel.

For harvesting, a second man serves the two-row harvester, hauling the shelled corn to the drier and storage.

Much of the land on which Mr. Walters plants his corn, normally about 400 acres, has a rather heavy soil, Hoytville clay loam to silty clay loam. With plow-plant and no cultivation, the soil is improving in structure from year to year.

Moisture from rains and melting snow more quickly replenishes soil supplies and excess moisture more quickly reaches the tile drains. This is allowing earlier planting than when traditional tillage methods were used.

There are also areas of lighter textured soils, Berrien loamy fine sand. The "train" operates with equal effectiveness on this soil also.

THE END

PLANT GROWTH

Nitrogen

Of the three major elements mentioned, *Nitrogen* promotes particularly the development of stem and leaf and is required during early stages of growth. Too little nitrogen results in stunted growth with yellowish foliage. Too much induces rank growth, delays seed formation and ripening, and tends to make plants more susceptible to diseases.

Phosphate

Phosphorus stimulates root growth in the early stages and promotes seeding or fruit formation in the later stages of growth. It is, therefore, especially important when early ripening of a crop is desired.

Potash

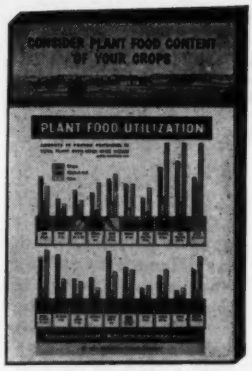
Potash is essential to the formation of the starches of potatoes and grains, the sugars of fruits and vegetables, the fibrous material of plants. It promotes increased yields of better quality and is particularly required by clovers and other legumes. An ample supply of potash in the soil helps to prevent disease and to lessen the effect of excessive nitrogen application. (Farm News #787, Department of Agriculture, Ottawa, Can.)

Answers to WHAT IS IT?

1—Artichoke; 2—Bread; 3—Cabbage Slice; 4—Salt; 5—Tomato Stems; 6 — Mushroom; 7 — Onion Rings; 8—Lettuce Leaf; 9—Orange Slice; 10—Corn Kernels.

(CUT ON DOTTED LINE—YOUR MAGAZINE WILL NOT BE HARMED—SEE REVERSE SIDE FOR OTHER MATERIALS)

(CUT ON DOTTED LINE—YOUR MAGAZINE WILL NOT BE HARMED—SEE REVERSE SIDE FOR OTHER MATERIALS)



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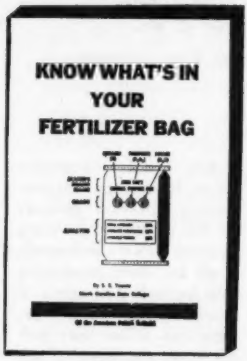
A KIT-OF-THREE FOR YOUR SOIL FERTILITY WORK

ON PLANT FOOD REMOVAL

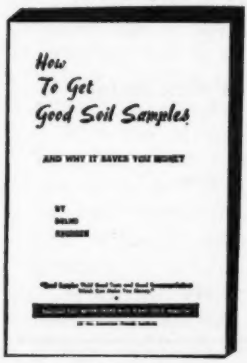
This gives how much plant food your crops remove from the soil, a composite picture of the N, P, K contained in good yields of 28 important crops citing large removals by legumes, plant food sources, and the trend toward higher analysis plant foods.



Q-11-59—Above free quantity $2.00 per 100

ON FERTILIZER CONTENTS

This clearly explains what a fertilizer is, why it is important, what the different types are, the difference between material and grade and ratio, a look at specialty materials, how they should be used.



JJ-12-58—Above free quantity $3.00 per 100

ON SOIL SAMPLING

This gives the steps to good soil samples—the advice, what tools, how to divide field, depth by auger or spade, proper mixing, labeling, diagramming field, information, proper packing, etc.

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FOLDER C-59

Do you want to prevent hidden hunger in crops? If so, this folder will acquaint you with that all-important hidden hunger zone on the yield curve and how to deal with it. It points out how crops often do not show definite deficiency symptoms but still need extra plant food.

FOLDER E-59

Here are graphic pointers on safe, efficient fertilizer placement. How to avoid injury to seedlings. How to use nutrients efficiently from start to finish. How *right* placement pays on specific crops. How to get the right start, to build fertility, to maintain it, etc.

Quantities above free policy (stated below) only $1 per 100, $10 per 1000

FOLDER B-59

Here is shown the role of potash on yield and quality. How much potash certain basic crops take from the soil in a year. How heavy nitrogen treatment can cause crops to use up available potash *fast*. How potash affects quantity, quality, drought and disease resistance.

FOLDER D-59

This folder capsules plant food corn absorbs during different periods of its 4-month growing season—the minerals used by corn producing 100 bushels per acre. It shows what corn ears look like when they suffer from shortages of nitrogen, phosphate, and potash.

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WHY FISH FAILED—FROM PAGE 9

analysis of an ox, that water, lime, nitrogen and phosphoric acid are needed to perfect its body, but such analysis would not show the actual need of air any more than it would the need of potash. Yet who would take that analysis and try to prove that the ox does not need an abundance of air?

For example, the grain of corn shows a low proportion of potash, and yet this small amount determines the quantity and quality of the crop, for corn is largely composed of starch, and potash is needed to form it. A farmer may add nitrogen to his soil by growing clover or cow peas, but he can only add potash by buying it in grains or fertilizers.

There is another thing to be considered. The farm is more likely to lose the fertilizing effect of the potash purchased in grain than of the other elements. The greater part of such potash is voided in the liquid manures.

As we have said, the potash is not stored up in the body as the other elements are. It serves its purpose in aiding digestion and then passes away, chiefly through the kidneys.

In a ton of liquid manure from a horse there are thirty pounds of potash, while in a ton of pure solids there are only seven pounds. This proportion is larger still with cattle and sheep.

When we know this, we can see how easily potash is lost to the cultivated fields. A large proportion of the liquids are voided in the pasture or on the road, so that much of the potash bought in the grain never reaches the fields where crops are grown.

It is true that quantities of nitrogen and phosphoric acid are also lost in this way, but there are more of these in the grain to begin with, while the proportion of potash in the liquids is higher. This being so, we can readily see how in the average manure pile, the loss of potash by leaching must be considerable.

Keeping Supplied: A Necessity

From every point of view, therefore, we see the necessity of keeping up the supply of available potash. Some soils contain ample supplies of it while others are nearly exhausted though rich in other elements. The old problem of baiting the dead fish with wood ashes in order to catch the corn, is repeated over and over again. The Indians along the mouth of the Connecticut River rarely failed to grow corn and had grain to sell. No doubt the Pilgrims wondered why these Connecticut Indians could grow corn with fish, while at Plymouth the fish failed after a few crops.

We should probably find now that these Connecticut Indians occupied soil naturally richer in potash and hence responded to the fish.

In modern times the famous red apples of the Ozark region in Missouri have become famous the world over for their size, color and firmness. It is now found that the subsoil and the flat surface stones in that "Land of the Big Red Apple" are rich in potash.

Connecticut fruit growers with a less fertile soil have been able by the use of good culture and a high per cent of potash in their fertilizers to back up the following legend which was exhibited at a meeting of the Connecticut Pomological Society:

"Not the land of the big *red apple, but the land of the* good *red apple!"*

THE END

**AT WORK ON SOILS?
A KIT-OF-THREE WILL HELP YOU
TURN TO PAGE 27**

(CUT ON DOTTED LINE—YOUR MAGAZINE WILL NOT BE HARMED—SEE REVERSE SIDE FOR OTHER MATERIALS)

USDA Centennial Commentary I

IT ALL BEGAN ON MAY 15, 1862 . . .

By J. Denneth Guthrie **Washington, D. C.**

WHEN President Kennedy proclaimed 1962 as the U. S. Department of Agriculture Centennial Year, a well-deserved spotlight was focused on a system of agriculture that has enabled America to lead the world in food and fiber production. Commemorating the founding of the Department and the Land Grant Colleges is a deserved expression of gratitude becoming to all our citizens.

This is so because our nation largely owes its present living standard to agricultural progress. In fact, one farm worker can now produce enough food for 25 other people. In the early days, one worker produced enough for only 6 people.

It all began on May 15, 1862 when the 37th Congress approved the following legislation:

"Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, that there is hereby established at the seat of Government of the United States a Department of Agriculture, the general design and duties of which shall be to acquire and to diffuse among the people of the United States useful information on subjects connected with agriculture in the most general and comprehensive sense of the word, and to procure, propagate, and distribute among the people new and valuable seeds and plants."

The Act further provided that "there shall be appointed by the President, by and with the advice and consent of the Senate, a Commis-

sioner of Agriculture who shall be the chief executive officer of the Department of Agriculture."

The First Duties

The first Commissioner was Isaac Newton, at a salary of $3000 per year. His job was to acquire and preserve agricultural information, to carry on practical and scientific experiments, to collect statistics, to collect new and valuable seeds and plants and to test them by cultivation, and to propagate those that were worthy of propagation for distributing to agriculturists.

During the first year of operations the USDA spent approximately $60,-000. In his first report, Commissioner Newton estimated that for the second year the USDA would need $130,000. Among early accomplishments was the distribution of 306,000 packets of seeds, largely through members of Congress.

A Typical "Remedy"

Looking back to these early times, present day agriculture is greatly indebted to those who have gone before. Back of the combine is the binder, the reaper, the cradle. Back of the mower *is* the scythe. And back of the tractor are innumerable horses and mules.

Along with these factors were the long hours and hardships, both for the farmer and his family. Lack of agricultural research information in those days often stimulated many superstitions and questionable practices.

In fact when blue mold struck tobacco plant beds (even as late as the 1930's) and growers were at a loss to know how to control the disease, the local sage in a tobacco growing community recommended that farmers obtain *some dust from under an old house and sprinkle it on their plant beds as a remedy.*

Progress in Fertilizers

Fertilizers, too, have had their upcoming. The present applications of highly concentrated analyses and materials have come from many years of cumulative research and educational effort, both on the part of official agricultural institutions and the industry.

While working in a commercial fertilizer factory not too many years ago, the writer helped mix an 0-11-3

analysis. It was sold under the brand name of "Little Gem." Also 1-9-4 was sold in large tonnage, as was 2-8-5. These contrast sharply with the 10-10-10 and the 4-12-12 of today.

"Emphatically A Potash Plant"

Inquiries about fertilization problems did not begin with the Department of Agriculture and the Land-Grant College system. Apparently local farm journals were one of the earliest sources from which the more inquisitive (and obviously progressive) farmers could get answers to their questions about fertilization.

A good example was the inquiry the *American Farmer* of 1853 received in Baltimore. What this farmer asked about "guano for wheat and corn" and the answers he received were featured in the *Citizens' and Farmers' Almanac* of that year:

"I have never used guano on my land, but intend to do so next fall. You will please answer the following questions in the July No. of *The Farmer.*

"Would it be proper to fallow your land, harrow it, and sow the guano, or guano and plaster, with the wheat, and put them in with the shovel plows?

"How deep ought guano to be put in the ground?

"Where it is sown on corn land, what is the best mode of putting it in?

"How many pounds of guano ought to be put on one acre?

"Give such other information as you may deem proper.

Yours respectfully, L."

Replies to the Above Questions.

"The guano should be mixed with plaster, at the rate of 100 lbs. of guano, to 25 lbs. of plaster, sown broadcast, and ploughed in as soon after as possible; the ground then to be harrowed until a fine tilth is obtained, preparatory to sowing the wheat, which may be either ploughed or harrowed in, provided the seed is not covered more than 2 or 3 inches. Water furrows should be then formed, and the field rolled across the furrows. Unless the soil be very poor, 200 pounds of guano will be enough—if very poor 300 pounds to the acre should be applied. The depth of the furrow is not material, as the plants will find the guano whether covered 4, 6, or 8 inches.

"For corn, the guano and plaster should be mixed together as above, sown broadcast, and ploughed in.

"Corn being a heavy feeder, 400 lbs. of guano to the acre will not be too much. The ground, after the guano is ploughed in, should be top-dressed with from 5 to 10 bushels of ashes per acre, as there is but a comparatively small per centum of potash in guano—sometimes a mere trace—and corn is emphatically a potash plant. 200 lbs. of guano, with the usual allowance of barn-yard manure, would answer; but in any event corn ground should always receive a dressing of ashes, potash being essential to the success of the crop."

These 1853 impressions of Peruvian guano were not far from reality. In later years, Peruvian agronomists commonly regarded "guano rico" from the coastal islands as having an analysis of 13-6-2.

Not only the U. S. Department of Agriculture and the Land-Grant Colleges can take pride in the achievements of these 100 years, but also the commercial companies who provide fertilizer, lime, farm machinery, seeds of high yielding ability, insecticides, fungicides, and a host of other improved materials and supplies—for they, too, have implemented the progress and often demonstrated the improved practices.

THE END

MORE CAPACITY TO PRODUCE

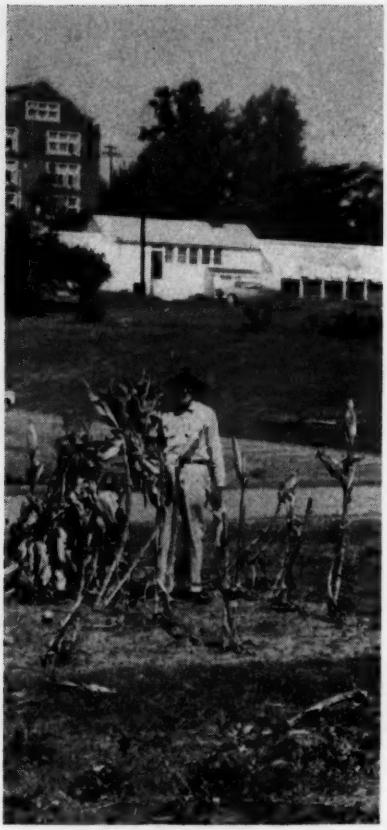
Remarkable New Family of High-Performance Funk's G-Hybrids can increase your Corn Profits

FUNK'S G HYBRID

New high-performance Funk's G-Hybrids have *more capacity to produce* than do other hybrids. They will raise yield levels and increase profits per acre on your farm with your present growing practices —will far outstrip other corns if you plant more thickly, fertilize more heavily.

Ask your Funk's-G dealer to show you Weigh and Compare proof of G-Hybrid superiority on farms near you.

THE PRODUCERS OF FUNK'S G-HYBRIDS



1861 METHOD

1911 METHOD

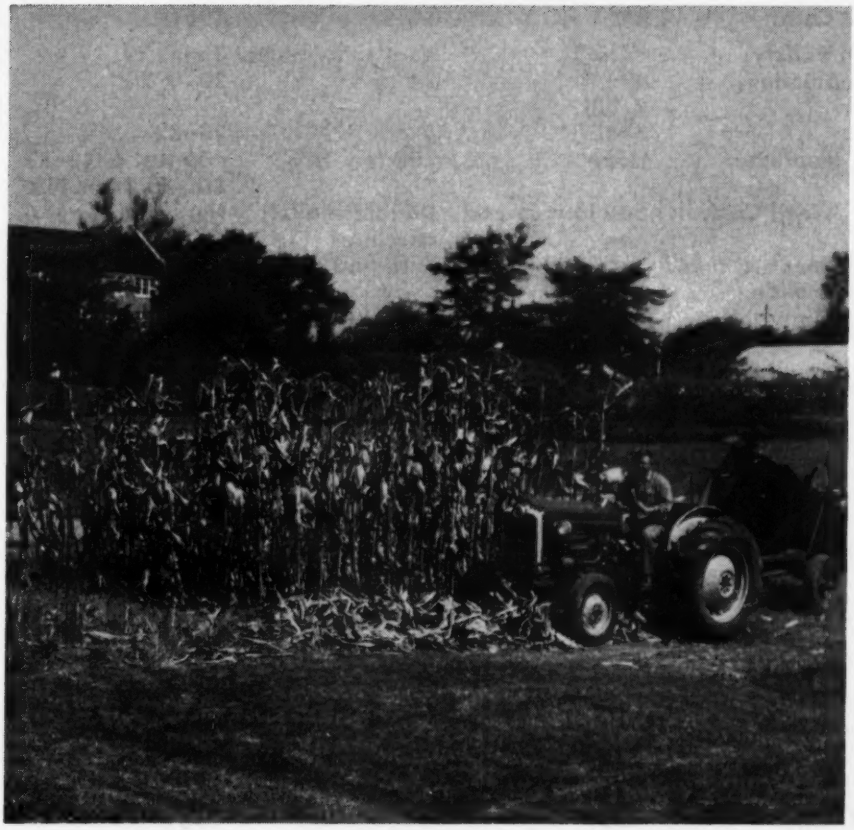
CROP PRODUCTION . . .

FUTURE historians of this century (1861-1961) will undoubtedly place crop production high on the list of factors that caused America to become the world leader of the 20th century.

The reason is twofold: Not only has American food production kept up with—and ahead of—a rapidly growing population, but the means of producing it have been so constantly streamlined that more and more citizens have been freed from the labors of crop production to expand the nation's scientific and industrial life, as well as participate more fully in its cultural and political life.

In statistics, the picture is a simple one: 100 years ago about 85% of the people worked to produce enough food to feed the other 15%. Today less than 10% produce enough to feed the other 90%.

Throughout 1962, American agri-



TODAY!

culture will observe the 100th anniversary of its modern way of life, so to speak, since the U. S. Department of Agriculture and the land-grant system of education were created a century ago.

To help observe this 100th birthday, the University of Tennessee has launched a series of demonstrations called The Centennial Plots, designed to illustrate the progress made in crop production over the past century.

The Tennessee specialists have worked out an extensive program for using corn, small grain (wheat or oats), hay, pasture, and strawberries in the rotation. In each case, the crops will be planted, cultivated, and harvested by the respective methods of today, 50 years ago, and 100 years ago.

Such a rotational program will prolong the exhibit over the next several years, enabling it to be used for field days and other functions held at the Knoxville Experiment Station. Similar plots are also planned for the branch experiment stations.

Although the plots were primarily

TABLE I CENTENNIAL DEMONSTRATION J. N. ODOM, KNOXVILLE STATION

1. Corn:	**1861**	**1911**	**1961**
Variety:	**"Crib"**	**Neal's Paymaster**	**Tenn. 29**
Population:	**4′ x 4′ 2/hill**	**24″ x 4′**	**20″ x 20″**
	5445	**5445**	**15682**
Fertilizer:	**None**	**200 lbs. 16%**	**400 lbs. 6–12–12 300 lbs. Am. Nit.**
Weed Control:	**Bull tongue and hoe**	**Double shovel and hoe**	**Herbicide**
Seedbed Preparation	**Turn and harrow**	**Turn and disk**	**Plow-plant**
Harvest:	**Top and Strip**	**Shock**	**Pick**
2. Small Grain:			
Wheat:	**1861**	**1911**	**1961**
Variety:	**?**	**Fulcaster**	**Knox**
Fertilizer:	**None**	**150 lbs. 16%**	**300 lbs. 4–12–8 100 Am. Nit.-T.D.**
Seeding:	**Broadcast and bull tongue**	**Broadcast and disk**	**Drill**
Harvest:	**Cradle**	**Binder**	**Combine**
Oats:			
Variety:	**Turf**	**Culberson**	**Blount**
Fertilizer:	**None**	**150 lbs. 16%**	**300 lbs. 4–12–8 100 lbs. Am. Nit.-T.D.**
Seeding:	**Broadcast and bull tongue**	**Broadcast and bull tongue**	**Drill**
Harvest:	**Cradle**	**Binder**	**Combine**
3. Hay:	**1861**	**1911**	**1961**
Crops 1961:	**Millet and Peas**	**Lespedeza**	**Lespedeza**
Variety:	**German-Whippoorwill**	**Common**	**Kobe**
Fertilizer:	**None**	**None**	**200 lbs. 0–20–20**
Crops 1962:	**Millet and Peas**	**Redtop and Lespedeza**	**Alfalfa**
Variety:	**German Whippoorwill**	**Common**	**Buffalo**
Fertilizer:	**None**	**None**	**1000 lbs. 0–9–27**
4. Pasture:	**1861**	**1911**	**1961**
Crops:	**Lespedeza and Redtop**	**Hop Clover and Bluegrass**	**White Clover and Orchardgrass**
Variety:	**Common**	**Ky.**	**Ladino and Potomac**
Fertilizer:	**None**	**None**	

5. Strawberries:	**1912**	**1962**
Variety:	**Missionary**	**Tennessee Beauty**
Spacing:	**24″ x 4′**	**24″ x 4′**
Fertilizer:	**3–5 tons Barnyard manure**	**?**

CENTENNIAL DEMONSTRATION PLOTS

Mound Range 3—60′ x 110′

corn this year, the specialists hope to follow the full recommendations in getting the complete crop rotation under way within the next year or possibly two.

The pictures on pages 34 and 35 tell a clear story of what has happened to American crop production in the past 100 years—with emphasis here on corn harvesting.

In 1861 corn was harvested by the topping and stripping method. This was a method used mostly in the southeastern United States. The leaves and tops were cut off with a corn knife or by hand and fed as green feed while the ears were then left to ripen.

In 1911, the crop was harvested in shocks to later be shredded. The corn binder was used to cut the standing corn or it was still cut by the old method of using a corn knife if a binder was not available.

In 1961, there is of course, no one method of harvesting corn. It is harvested depending upon the intended use, or perhaps the need. Corn can be used for silage or grain. It can be picked and stored on the cob, picked and shelled for storage in grain bins, or chopped green for silage.

A tremendous amount of crop production history is capsuled in tables 1 and 2. They show the complete plans for the Tennessee rotation, giving variety, fertilizer, seeding, and harvesting for the three periods in history. They are based on the Centennial Demonstration plot work guided by J. N. Odom.

We shall not waste your time repeating here what these tables obviously say. But we would call two areas to your attention: The interesting progress in (1) corn fertilization and (2) forage production.

As anyone in agriculture knows, the amazing evolution in crop production cannot be placed at one source. Many factors have caused it. Fertilizer, better cultural methods, hybrids, educational research, etc. These all have increased the per acre yields of all crops.

Tennessee is a good example:

Wheat—from 5.5 bu. per acre in 1866 to 21 bu. per acre in 1960.

Tobacco—from 718 lbs. per acre in 1866 to 1,636 lbs. in 1960.

Cotton—from 121 lbs. per acre in 1866 to 545 lbs. in today's estimated yield.

Corn—from 21 bu. per acre in 1866 to 40 bu. today—with the big surge here being since 1940.

The great drama of crop progress in Tennessee—and the nation—can be traced directly to the land-grant system of higher agricultural education launched a century ago. **THE END**

NEW FORAGE PROGRAM

A forage testing program has been started by the University of Missouri College of Agriculture and Extension Service.

This service will provide dairymen and cattle producers with a chemical analysis of their livestock feeds, both forage and grain. A committee of University faculty members laid out the plans for the testing procedure. The committee included livestock and dairy specialists, and agricultural chemists.

Forage testing can help farmers do a better job of livestock feeding at lower cost, according to George Garner, agricultural chemist and committee member. For example, he said one dairyman, after having his hay and silage tested, was able to adjust his ration to feed more hay and less concentrate. He figured he saved $45 a week without hurting milk production from his 60-cow herd.

This year the College of Agriculture will test forages at cost. A protein test will cost $1.50; a fiber-protein combination, $3.50. To encourage a farmer to take a complete feed inventory, a special price of $10 will cover costs on one silage sample, two hay samples, and one grain sample.

County extension agents have information forms and containers for samples. Agents also have information on how to take samples. It's important that samples be taken carefully so that they accurately reflect the total feed supply.

Chemical analysis of roughages will give crude fiber, crude protein, digestible protein, and total digestive nutrients (or net energy). Grain will be analyzed for protein.

Missouri Farm News Service

MORE LIME NEEDED

VIRGINIA farmers aren't using enough lime!

This fact is pointed up in the summary of the reports on 77,000 soil samples tested in the soil testing laboratory in the agronomy department at Virginia Polytechnic Institute during 1960.

W. W. Lewis, agronomist at VPI, says 41.7 percent of the soil samples tested below 6.0 pH. A pH test of 6.0 to 6.5 is considered best for most crops in Virginia. Some crops such as tobacco, peanuts, and alfalfa have different requirements.

Over 22 percent of the potash tests were low, 65.4 percent were medium, while 27.6 percent of the phosphate tests were low and 31 percent were medium. Lewis says the tests vary in different sections of the state. Generally, soils from the coastal plain will test lower in potash. Western Virginia will generally have lower phosphate tests. Soils and past fertilizer practices are responsible for the variations.

Lewis says Virginia should be using around 1,000,000 tons of lime each year, but the actual rate runs only a little over 600,000 tons.

During the last few years trouble with barley has been traced to the need for lime. Summary on tests from barley fields shows that over 37 percent of the samples test below 6.0 pH.

A summary of alfalfa samples shows that 49.1 percent of the samples test below the lowest recommended limit for efficient production. And 65.3 percent of the samples from alfalfa fields tested medium or low in potash.

There's a lesson to be learned, Lewis says. Have your soils tested, and lime and fertilize as indicated. Otherwise you're farming in the dark.

VPI Extension Service News

For Reliable Soil Testing Apparatus there is no substitute for LaMOTTE

LaMotte Soil Testing Service is the direct result of 30 years of extensive cooperative research. As a result, all LaMotte methods are approved procedures, field tested and checked for accuracy in actual plant studies. These methods are flexible and are capable of application to all types of soil, with proper interpretation to compensate for any special local soil conditions.

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SOILS PREACHER EMERITUS

AN agricultural college editor once told *Better Crops* that when he went out to the University of Wisconsin a few years ago to do some graduate work, one of the first voices he heard was that of C. J. Chapman over radio station WHA.

The first time he heard the veteran Extension Soils Educator that year, Chapman was urging farmers to use sufficient lime and fertilizer to help break the cost-price barrier in their production.

The last time he heard Chapman that year, he was urging the same thing—soil building and low unit cost crop production through the use of lime and fertilizers in a good soils and crop management program.

The editor concluded, "Chapman didn't just talk about it or lecture on it or promote it—he *preached* it! He sounded much like an old-fashioned country preacher urging his listeners to take to the sawdust trail—or, in this case, to the fertilizer trail."

Perhaps this editor's reaction to the Chapman approach was colored by its contrast to what he had known in his past educational and editing experiences. But to anyone who has followed this "preacher of the soils" in Wisconsin, the editor was not far off.

This magazine should know. Since November of 1927, C. J. Chapman has contributed over 40 articles to *Better Crops,* averaging slightly over one per year. This is not to mention the other farm magazines (state and national) or newspapers (daily and weekly) or radio broadcasts through which this unusual spokesman has reported hundreds of trials and demonstrations over the past 4 decades.

Veteran Farm Writer Elwood R. McIntyre, in a nationally circulated artical on Chapman appearing in the *Plant Food Review* 3 years ago, aptly called the Extension Educator a "soil-saving circuit rider" because he had "spoken at almost every crossroads and demonstrated on nearly every soil type in his native state."

A Running Diary

Although his written and spoken messages have run into the hundreds, *Better Crops* files show that the Chapman articles were not innocuous little bits of academic tabulation slapped hurriedly together by some bright-boy-agronomist more eager to register another published article on his "career speedometer" than to provide really useful information to the farmer's perennial quest for prosperity.

Chapman's articles were a running diary, in a sense, of the hundreds of plant food trials and demonstrations that he and his colleagues were conducting throughout Wisconsin.

They were not made of high-toned theories or complex correlations tracing troubled little cations at work in some remote hothouse root-and-soil-particles system—important as such fundamental work is.

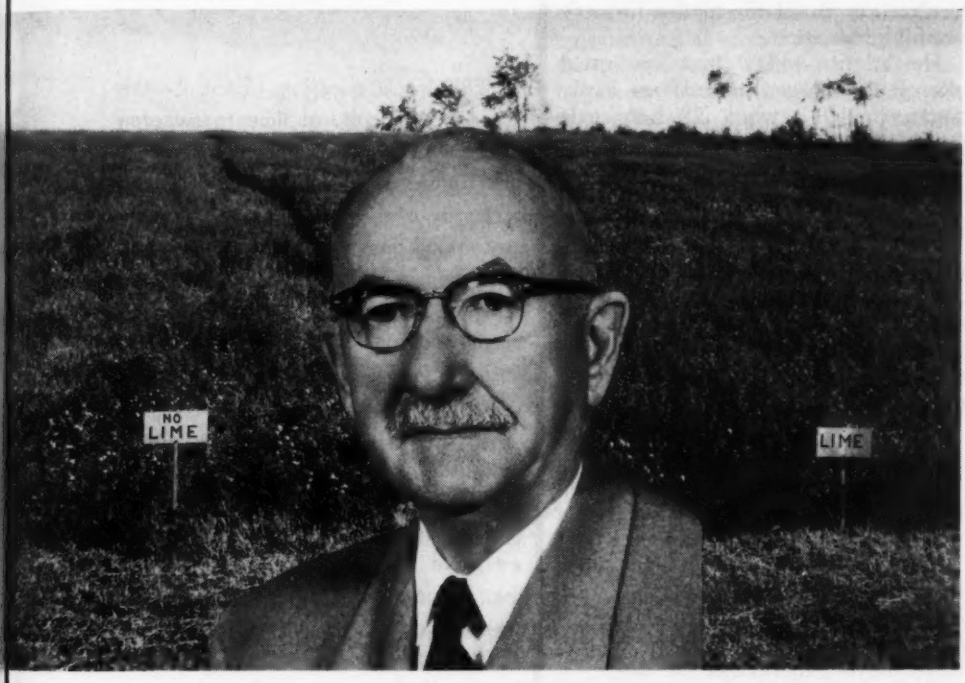
Chapman was not a researcher. He was an applier of research results, a teacher-on-the-go. His articles talked about saving hungry soils, early asking the farmer if he was soil-mining or soil-building.

They presented positive evidence that it pays to balance your soil fertility. They offered tangible defense against soil fertility losses and showed how production could be doubled by bettering soils.

They revealed what efficient management could do to bring about abun-

dant pastures and pictured whole-farm demonstrations literally lifting the farmer's standard of living right before his eyes. They documented actual fertilizer practices that doubled and trebled hay and grain yields in northern Wisconsin and explained why potash usage was on the rise.

They praised—while clearly showing—the magic of nitrogen and warned—by documenting the fact—that Wisconsin's soil bank balances were running low in nitrogen and potash. They early showed how nitrogen usage can increase the need for minerals and how fertilizers will cut production costs.



The Fire Starts

Although this Wisconsin Extension Educator recently completed his first year of retirement, he is far from retired in his continued interest in profitable soil building. The forceful lime article accompanying this brief profile attests to that.

Much water has gone under the bridge—and fertilizer and lime into midwestern soils—since young high school teacher C. J. Chapman caught the early morning train out of Mazomanie, Wisconsin, on the way to Stevens Point in June, 1916.

He was traveling to accept a job under Dr. H. J. Wheeler as agronomist and field representative for the American Agricultural Chemical Company.

Before Wheeler had become chief agriculturist for the large firm, he had been Director of the Rhode Island Experiment Station and recognized as a top soil chemist of the era. Chapman says Wheeler put real science into the commercial program, "being a meticulous and precise worker who demanded all plots done on a specific, detailed schedule."

Young Chapman was apparently

SOILS PREACHER . . .

in good hands for getting his start.

These first years as a commercial agronomist—setting up fertilizer demonstrations on potatoes in north central and central Wisconsin, on corn down in Lafayette County where he had helped his family run a truck farm in his teens, on winter wheat in Ohio, on potatoes, corn, and grain throughout Minnesota—early set Chapman "afire" with what right fertilization could do to the farmer's overall production.

He admits today that his great interest in nitrogen as fertilizer easily began in 1917 when 22 acre-scale topdressing demonstrations on winter wheat in Ohio showed outstanding increases "from nitrogen in a blended mixture with phosphate and potash." The results ranged from 3 to 13 more bushels per acre.

These results were still ringing in the young agriculturist's mind as he lined up to take officers' training at the Great Lakes Naval Training Station in 1918.

Why Back to Soils?

When he joined the Wisconsin Extension Service in 1921, Chapman was returning to the campus where 10 years before he had "slung hash, tended furnace, and played trap drums in a jazz band" to earn a college education. In summers he had hired out to ranchers in the West.

Why did he choose to return to a soils career after the Navy? His earlier experiences under Dr. Wheeler played a big hand, but also some exciting winds of new thinking and new methods in soil improvement were stirring in Wisconsin—and young Chapman liked the feel of fresh breeze.

This atmosphere consisted of many factors too numerous to detail here. But some stand out:

The influence of Soil Physicist F. H. King's highly stimulating lessons

TIME TO LIME

THERE is no question about it—the use of agricultural lime to sweeten the acid soils in Wisconsin has been a most important factor in pushing the acreage and yields of alfalfa to present all-time records.

Wisconsin farmers in 1960 harvested 9,394,000 tons of hay, of which alfalfa accounted for 7,100,000 tons, from a total of 2,898,000 acres.

The 1960 acreage of alfalfa was the largest in history, in fact, has been estimated as largest for any state in the United States. Fortunate indeed that over a period of several years we have had some hay to spare for the farmers in the drought stricken states, south, east, and west of us.

The combined and net result of increased lime usage has been to raise the level of all crop production on Wisconsin farms. Consider the indirect contribution that the greatly increased acreage of alfalfa has had in terms of added nitrogen. The bacteriologists tell us that a 4 ton crop of alfalfa will "fix" about 200 pounds of nitrogen annually through the median of the bacteria within the nodules on the roots of the crop.

With alfalfa growing on 2,898,000

By
C. J. Chapman

Extension Soils Emeritus
University of Wisconsin

Wisconsin acres and accounting for 7,100,000 tons of hay (an average production of about 2½ tons per acre) let's assume that each acre of alfalfa takes or "fixes" 100 pounds of its nitrogen from the air. That totals close to 145,000 tons. And these calculations do not include the nitrogen "fixed" by the 1,043,000 acres of medium red clover and the several hundred thousand acres of other legumes such as canning peas, soybeans, etc.—all of which have been benefited from the 40 million tons of lime applied on Wisconsin's farm lands during the past 26 years.

Two million acres of alfalfa harvested annually by Wisconsin farmers over the past several years!! And what was all that hay worth? Figure it out for yourself—6 million tons a year at $25.00 a ton. A value of 150 million dollars a year. *The 40 million tons of lime applied to Wisconsin's acid soils in the past 26 years has made this possible.*

Liming Job Never Done

In spite of all I've said about achievements to date, alfalfa yields are not what they ought to be. Over . . . his native state grown progressive enough to finance statewide soil testing . . . the great Emil Truog developing a new zinc-sulfide-lead-acetate acidity test for lime needs. . . . The first USDA bulletin on "An Extension Course in Soils," developed for farm leaders of soils study groups by his former teacher, A. R. Whitson . . . a state-federal soil survey program gearing up under M. F. Marbutt . . . a county agent system beginning to emphasize soil improvement and demonstrations. . . . Soil erosion control beginning to germinate in some pioneer minds . . . fertilizer analyses entering the regulatory period and local dealers becoming aware of scientific soil treatment.

Soon he was caught up in the winds of progress, rapidly becoming with his associates a pioneer of the theme: "Plenty with plant food." Teaming with plant breeders, insect and plant disease specialists and agricultural engineers, they were soon getting eye-popping yields to jar the oldline thinking of many farmers toward mineral fertilizer.

Sweeping Strides

The striking changes Chapman has witnessed in Wisconsin portray, in a sense, the nation's unusual agricultural progress of the past 4 decades.

For example, the year he caught that train out of Mazomanie to join Dr. Wheeler in 1916, Wisconsin farmers used hardly 5,000 tons of fertilizer. They used 474,000 tons in 1959. And for the past 10 years have averaged better than 425,000 tons.

He has watched corn yields climb to an average of some 65 bushels per acre, with a record total of 181,480,000 bushels in a recent year.

He has seen potatoes that were averaging less than 100 bushels per acre 40 years ago increase their yields to more than twice that average—

SOILS PREACHER . . .

with hundreds of acres some years yielding 700 or more bushels per acre.

And more important than such production changes—indeed the reason for them—has been the changed thinking of the farmers and the public toward soil conservation practices and plant food usage. Chapman not only witnessed this evolution but played a major role in it.

"Well! Well! Well!"

When you go from 50,000 acres of a crop to nearly 3,000,0000 acres of it in one generation, more or less, someone has done a selling job. That job happened in Wisconsin. The crop was alfalfa. And one of the major salesmen was C. J. Chapman.

Out of the 8,394,000 tons of hay Wisconsin farmers harvested in 1960, alfalfa accounted for 7,100,000 tons from a total of 2,898,000 acres. He mentions this in his accompanying article.

This national leadership in alfalfa acreage cannot be separated from the 40 million tons of lime used on Wisconsin farmlands since the initiation of the state's large scale lime production projects 26 years ago. This includes, of course, marl, papermill sludge, sugar beet factory waste, and other sources of liming material in addition to pulverized ag lime.

A good example is the north central area of Wisconsin. Today lush fields of alfalfa grow abundantly in the area. It was not always so.

In fact, only two years after Chapman joined the Extension Service, a Farmers Institute Bulletin issued by Prof. E. L. Luther said in 1923: "Can farmers in the Colby soils area (now known as Spencer soils) of north central Wisconsin grow alfalfa? We have . . . valiantly contended that alfalfa would grow on these soils at no remote day and these Colby (now Spencer) soils will grow alfalfa to no

TIME TO LIME . . .

50% of all the 200,000 samples of soil tested in state and county laboratories are still in need of lime or more lime.

Thousands of acres of alfalfa last year were streaked and looked tough and beat out. In the sandy soil areas of central Wisconsin, hundreds of fields suffered from a lack of boron. In fact, there were thousands of acres in all parts of the state which were spotted and the yields were not what they might have been because of a lack of lime.

True, many of these fields have been limed once, some of them twice and three times, but the tremendous demand for lime by these lime-loving crops—alfalfa and clover—has pumped the lime out of these soils, causing them to become acid and sour again.

Many fields were not limed at heavy enough rates at the outset—those that were need more lime *now* after 6, 8, or 10 years of cropping. The job of liming is never done.

It's necessary to relime at intervals of every 8 to 10 years. So, we say, keep your soil just a little under the neutral point. In other words, just a trifle on the acid side.

Professor Emil Truog, who developed a test for soil acidity back in 1912 and has devoted a lifetime to a

. . . BY C. J. CHAPMAN

study of the relationship of soil acidity to the lime requirement of various crops, says, "For alfalfa, keep your soils well supplied with lime, maintain them at a pH between 6.5 and 7.0."

No question about it, the successful growing of medium red clover during the past 25 years has been due in part to a lime-rich soil.

Forty years ago we were all worried about clover failures and the big cry among our agricultural leaders at that time (and farmers as well) was "bring back clover." Well, here in Wisconsin it's back—due in part to the more general use of commercial fertilizers but more especially to the 40 million tons of lime which we have applied to our acid soils in the past 26 years.

Best Application Methods

For best results, we say apply lime on the plowed land and disc it into the soil. However, where more than 4 tons per acre is applied, it's best to spread half before plowing and disc it into the surface 4 inches, then plow and apply the other half and disc it in.

Many farmers ask the question about applying lime as a top-dressing to old established fields of alfalfa that are yellow and thinning out. We advise liming these old fields

end, far surpassing timothy and exceeding it."

"Well! Well! Well!," Chapman says today in his best preacher-language. "How true those words, for we now know that the Spencer soils of north central Wisconsin, with adequate amounts of lime and fertilizer, will grow magnificent crops of alfalfa and hundreds and hundreds of farmers are growing thousands of acres of this wonderful, protein-rich, palatable feed."

Evolution in Demonstration

His demonstration work seems to have evolved through several interesting stages:

1 *The county field-size trial*, to which he often carried grain drills and potato planters for cooperators to use. Usually a half acre to three acre plot program spotlighting specific contrasts.

2 *Whole-farm demonstrations*, later expanded to 500 farms in 52 counties. Usually Chapman guiding the county agents in offering the farmer a complete farm plan for soil and crop improvement, with a bonus in the form of a practical record keeping system offered by farm management specialists.

3 *The big push on 10-10-10* applied in plow-sole or furrow bottom, forerunner of today's heavy-rate nitrogen program on cornland.

4 *Intense promotion of forage fertilization*, emphasizing liming as well as high N fertilizer on grass and PK treatment on legumes and grass-legumes operations. Such work showed increases as high as 7,650 lbs. per acre in forage production. Helped develop some areas into what could almost be called alfalfa centers.

People who know C. J. Chapman intimately have often agreed and always sympathized with his some-

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times temperamental impatience with the "experts" who "do nothing but talk, talk, talk about work to be done."

A Disappearing Breed

He has walked out of many "expert-run" committee meetings and so-called program planning sessions only to get a job underway virtually alone. In that sense, he has been an individualist—so much so that he readily admits today that his "do it yourself" philosophy was a major shortcoming.

Few, if any, Wisconsin farmers will agree. And, after all, his mission was to them. In fact, many years will have to pass before Wisconsin will be without a farmer who can remember the sight of C. J. Chapman rolling into a neighbor's pasture or up to a roadside cornfield with a trailer load of fertilizer and equipment ready to mark off and set up some fertilizer demonstrations. He is, it seems, of a disappearing breed, regretably. He is among those characters who early got so busy selling farmers on the wisdom of efficient farming that they went on to useful careers that rose far above mere academic acclaim or status.

There was one named Hugh H. Bennett once. There is another named Emil Truog. Also one named Henry Wallace. Etc. Men with a quality of training born from minds and experiences that few "current croppers" will ever attain.

Chapman's work has not gone unrewarded, however. It has been recognized by the Wisconsin Farm Bureau, the Extension Service Chapter of Epsilon Sigma Phi, the Great Plains Agricultural Ammonia Association, the American Society of Agronomy, the Soil Science Society of America, etc.

But the most lasting reward was always the quiet, sturdy character sitting in the rear of a county courthouse meeting, waiting to tap Prof. Chappie on the elbow as he moved

TIME TO LIME . . .

next spring or fall. Remember, however, that lime is only slightly water soluble, and so, the finer the lime, the faster the penetration and the more effective it is where applied as a top-dressing.

The same is true where applied on plowed land. The effectiveness of the lime is in proportion to the fineness of the particles—but, of course, there are economic limitations in this matter of fineness of grinding.

Fertilizers, too, are needed on these old established fields that have produced the big crops of hay these past two years. They will need a good square meal of plant food to get them in shape for next year's hay crop.

Phosphorus More Available

Lime helps hold phosphorus in a more available form. In fact, it will "loosen up" or release phosphorus from acid soils. Soil tests made on fields that were limed 6 to 10 years ago and maintained at a pH of 6.5 invariably show a higher level of available phosphorus.

Where a soil is acid, the soil colloids or acid clay particles fix and hang onto the soil phosphorus. By liming, the phosphate which we apply in the form of superphosphate is kept from reverting to the more slowly available iron and aluminum phosphates. True, the liming of these soils to a pH of 6.5 reduces and slows down the rate

at which the phosphorus in rock phosphate becomes available.

We say in Wisconsin: don't stop with the liming of the cropland, rather plan to lime every acre of acid pasture land, and there are some 3,000,000 acres of permanent pasture in this state of Wisconsin that would be benefited from an application of lime.

Test Soil First

We also advise our farmers not to waste lime on land that doesn't need it. On the other hand, we say, "Don't waste high costing alfalfa and clover seed on acid soils." Take samples from the fields you plan to seed down to alfalfa. Have them tested not only for their lime needs, but also for fertilizer needs as well.

Test these old alfalfa fields where the big crops you have harvested the last two or three years have pumped the lime, phosphate, and potash down to low levels. 0-10-30 or 0-10-30B applied at rates up to 300 to 400 pounds per acre along with additional amounts of lime (where the soil is acid) will pay off in bigger and better crops of hay next year.

"Lime for the land's sake." Yes, lime because it's a good investment. But remember: "Lime without manure may make both farm and farmer poor, but lime plus phosphate-potash-clover will make the old farm rich all over."

THE END

through the crowd on the way out, to say briefly:

"Professor, just want to thank you for the fertilizer you recommended here last winter for our corn. I sure had a hell of a crop this year. Thanks."

A Gamut Runner

Like many of his disappearing breed, C. J. Chapman has been able to run the gamut of human relations in trying to get the job done. Even a surface look (such as this) at his career indicates that Chapman was about as much at home in some politician's office as he was at some agronomy convention—a talent not too common among the "more distinguished" colleagues, perhaps.

But somewhere down in the grain of his broad practical knowledge there must have been the cold, hard realization that the land-grant system of education fostering all this agricultural progress he was caught up in was actually created by politicians in a democracy based on free political choice:

By a New England one named Morrill . . . a Midwest one named Hatch . . . two Southern ones named Smith and Lever . . . and a sort of special Illinois one named Lincoln, who signed the law creating the USDA.

Chapman got in there and pitched. Apparently with little concern for his professional standing or reputation or whatever it is that causes many academic minds to worship at the alter of colleague-respect, daring never to be undistinguished or un-right about their oh-so-vital field.

Chapman, it seems, has yet to kneel at that altar, due largely to the fast trot he has maintained on the road to help the working farmer.

With plant breeder R. A. Brink, he led in getting a state law that made it legal to grant public funds for lime projects. He helped secure federal aid for equipment and personnel for

emergency county soil testing labs. At the time, four trained analysts handled the work at the state lab. Today's farmers have access to many such soil service stations.

But perhaps the best case of his gamut running goes back to the turbulent thirties when nearly everyone, especially the farmer, was scratching around for any plan that would save him from drowning in the flood from the Dam of Greed that had cracked wide open one gray Thursday afternoon in late 1929 on a bankers' street in lower Manhattan.

Among the various plans, Wisconsin had one called an Agricultural Lime Production Program, sponsored under one of the Emergency Work Projects. As a workhorse in that program, Chapman was invited along with some colleagues to counsel with Governor Phil LaFollette. The session had not been under way too long when the governor turned to Dean Christensen and Chapman, saying:

"Gentlemen, your lime production project is one of the most worthwhile ones brought to my attention. Here is a project . . . that will contribute millions of dollars in new wealth to our Wisconsin farmers by enriching the land. More than anything else, it will give farmers tax paying power in the years to come, and believe me, they'll need it."

Although C. J. Chapman now moves inevitably toward a day when his taxes will all be paid up, most Wisconsin farmers of today can trace a respectable degree of their strength to the roadside plots quilting much of their state with the simple theme: "Fertilizer Pays."

And at the bottom of the signs in the fields reading "No Fertilizer" compared to "12-12-12" (for example), there could rightly be a set of small initials designating the author of the project, signed simply CJC.

Better Crops has been honored to print his messages—s.m.

THE END

LIME AND POTASH TEAMMATES

LIMING an alfalfa field won't have much effect if the potassium content of the soil is low. Likewise, adding potassium won't help if the pH is too low.

University of Wisconsin soil scientists C. C. Olsen and R. B. Corey reported to the American Society of Agronomy that potassium content and pH work *as a team in affecting alfalfa yield.*

In fact, they seem to be the two most important soil factors where alfalfa yields are concerned, the scientists say.

Olsen and Corey have worked out a mathematical formula based on the pH-potassium interaction that has predicted alfalfa yields accurately in two years of tests.

This kind of formula is of no practical use to the farmer, but it is important to the soil scientist. The accuracy of its predictions tell him if the factors he's measuring really have important effects on yield. Inaccurate predictions tell him that there may be other important factors that he's not measuring.

This kind of work also helps the soil scientist find optimum levels of important chemicals in the soil, making possible better soil management recommendations for farmers.

The scientists tested the effects of the pH-potassium interaction on different alfalfa varieties and found that some will tolerate higher levels of pH than others. For instance, a mixture of Cossack and Ladak varieties did not reach maximum yield until enough lime was added to bring the soil pH up to 7.0. But Vernal alfalfa reached its peak at a pH of 6.3, yielding as much as the mixture did at 7.0.

University of Wisconsin News

The dam burst and the raging flood forced the people to flee to the hills. As they gazed down sadly at their flooded homes they saw a straw hat float gently downstream for about 50 feet. Then it stopped, turned around and plowed slowly upstream against the rushing water. After 50 feet, it turned and moved downstream again. Then upstream again. "Say," said one of the townfolk, "What makes that hat act so durn funny?"

"I ain't sure," spoke up a youth, "but last night I heard Grampa swear —come hell or high water he was agonna' mow the lawn today."

A conference is a group of people discussing what they should be doing.

Parson Webster phoned the local Board of Health to have a dead mule removed from his lawn. The young clerk who answered thought he'd be smart.

"I thought you ministers took care of the dead," he replied.

"We do," answered the parson, "but first we get in touch with relatives."

WOMEN are wiser than men because they know less and understand more.

Happiness is often overlooked because it doesn't cost anything.

The reason Cupid makes so many bad shots is that he is shooting at the heart while looking at the hosiery.

After one shuddering bite, the customer beckoned the waitress.

"Miss," he demanded sharply, "what is wrong with these eggs?"

"Don't ask me," snapped the girl. "I only laid the table!"

Not in the dictionary—The upper crust is a bunch of crumbs held together by their dough.

For every woman who makes a fool out of some man there is another who makes a man out of some fool.

One day an Indian came into a bank in Oklahoma and asked about a loan. "Me want $200."

"And what security have you?"

"Got 200 horses."

This seemed sufficient security and the loan was made. A short while afterward the Indian came back with $2,200 in cash, paid off the note and started to leave with the rest of the roll in his pocket.

"Why not let me take care of that money for you?" asked the banker.

Looking the banker straight in the eye, the Indian asked, "How many horses you got?"

SUCCESSFUL ORCHARDS!

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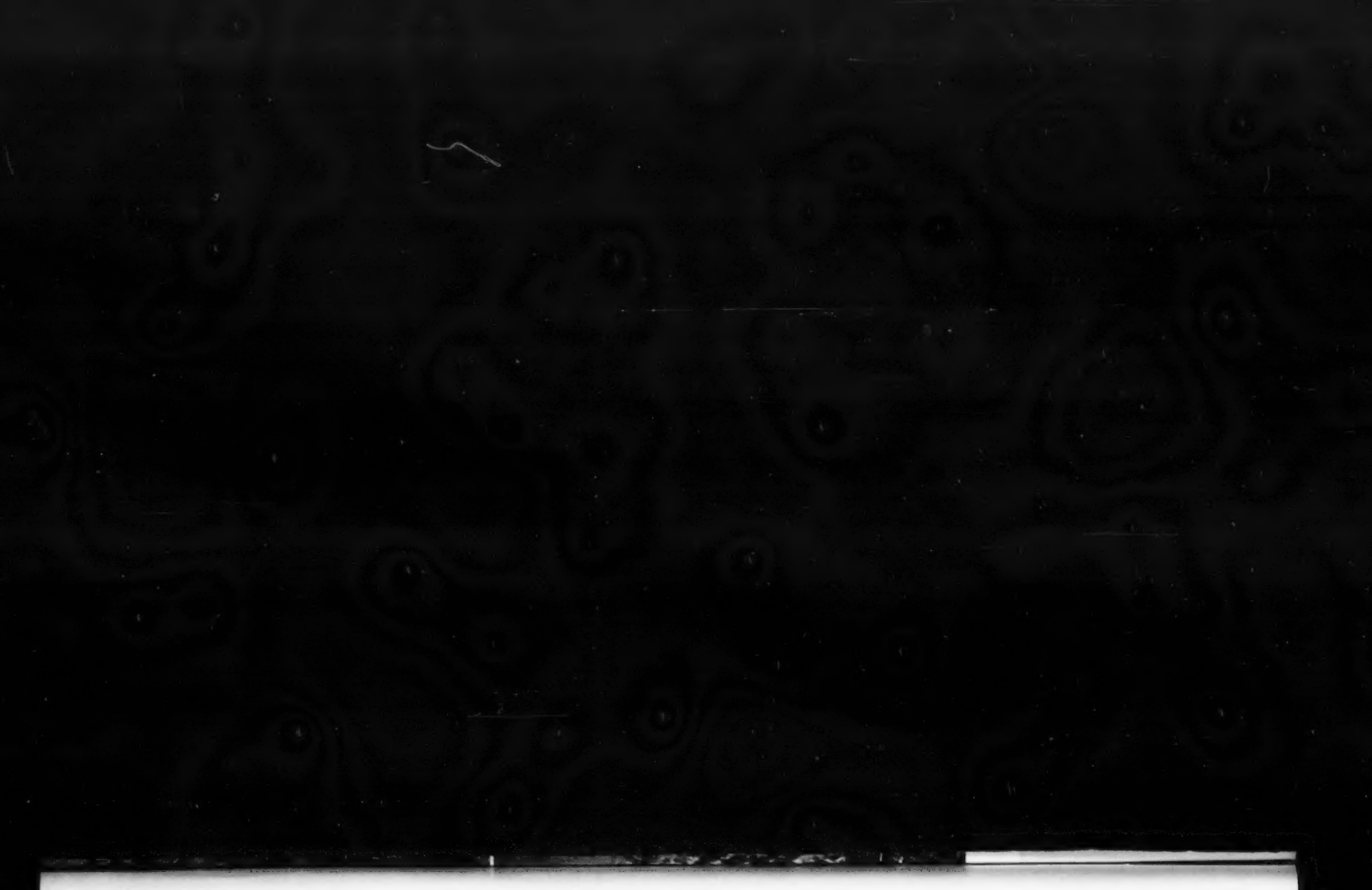
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